



New Home PCs

PC Labs Tests Four
Of the Hottest Ones

App Servers

Four-Way Pentium
Pros Power Up

NETWORK EDITION

Know Your Net

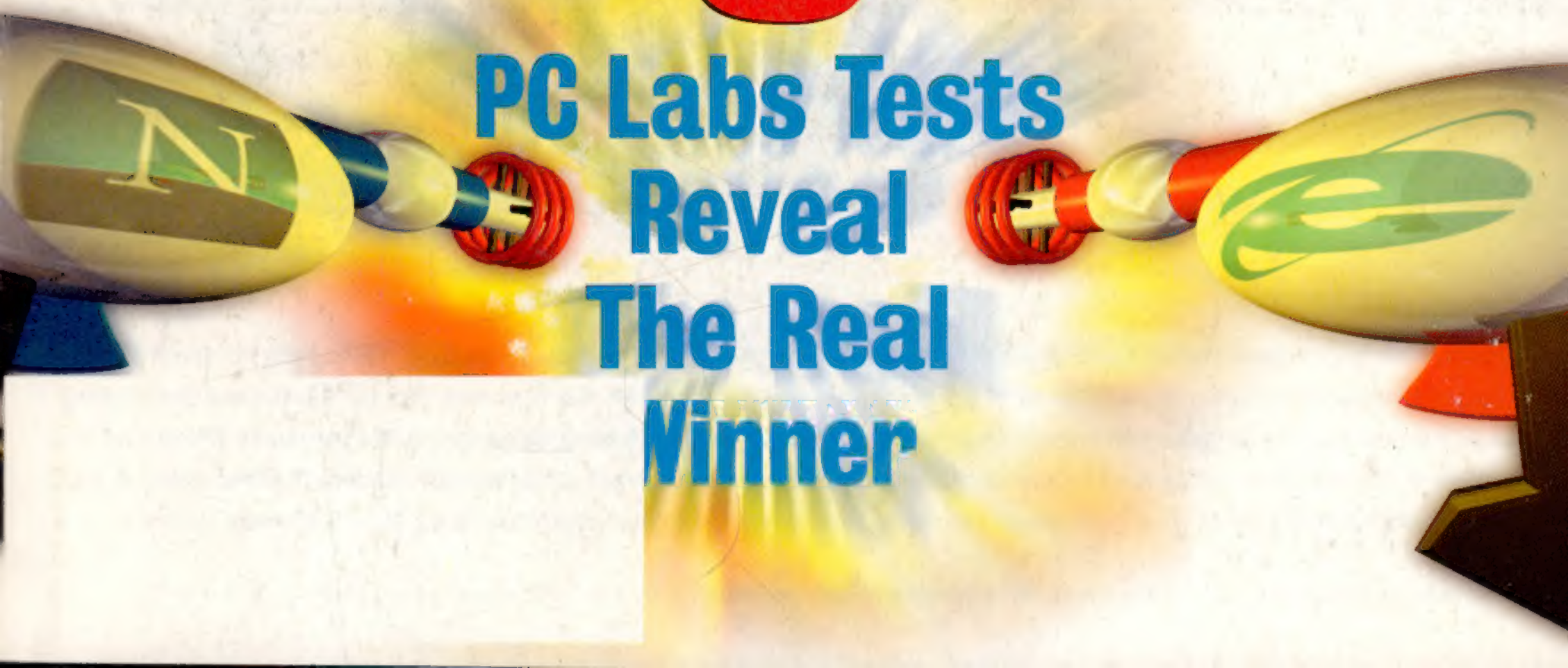
LAN Analyzers
For Every Budget

Color Printers

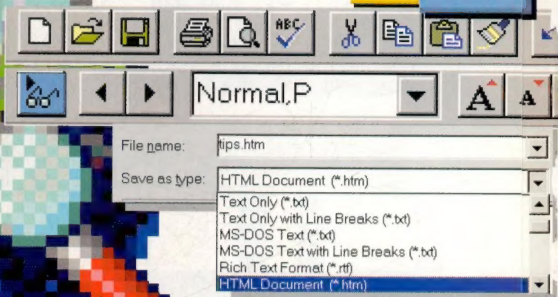
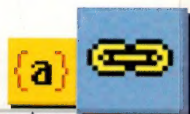
24 Options for
Business Users

MS INTERNET Explorer vs. NETSCAPE Navigator

**PC Labs Tests
Reveal
The Real
Winner**

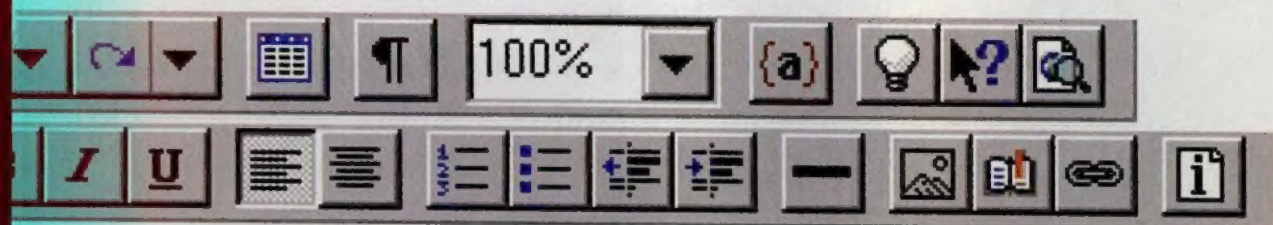


*Now you can
give your work
a worldwide
audience*



it

ar



HERE'S ONE WAY



TO GET PHOTO
REALISTIC COLOR
FROM CANON.



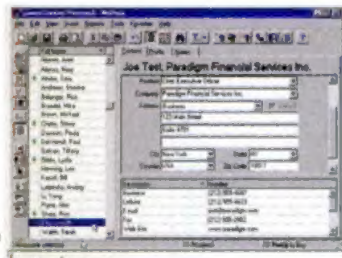
HERE'S ANOTHER.

Photo-realistic color has always been a focus for us at Canon®. Which explains why our latest development in Bubble Jet™ printing is photo-realistic color that's simply incredible. And why, with just a point-and-click, our new Canon Creative 2 software makes it incredibly simple to create everything from greeting cards, to brochures, to T-shirt transfers. For more information about our new line of Color Bubble Jet printers, call 1-800-848-4123, Extension 111. Or visit our web site at <http://www.ccsi.canon.com>. You'll find our printers nothing less than simply incredible and incredibly simple.

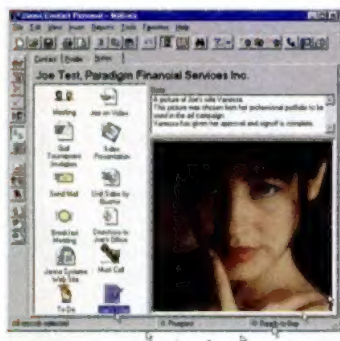
Canon

©1996 Canon Computer Systems, Inc. Canon is a registered trademark and Bubble Jet is a trademark of Canon Inc. CCSI, 2995 Redhill Ave., Costa Mesa, CA 92626. In Canada, call 1-800-263-1121, Extension 111.

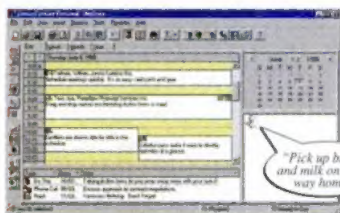
Janna Contact™ THE COOLEST Personal CONTACT MANAGER EVER



Easy Data Entry, unlimited addresses, custom fields, and categories. Powerful communications features (Caller ID, Autodial, E-mail and Fax). Customizable screen views and Import Wizards for all popular PIMs and Contact Managers.



Store every letter, fax, e-mail, spreadsheet, presentation, favorite Internet web site—even voice notes and full-motion video right with your contacts!



One-touch Action Items, Voice Notes, Drag-and-Drop Scheduling, Alarms, Automatic Roll-Forward of outstanding tasks and more!

Only
\$49

To order call toll free
1-800-268-6107, visit
www.janna.com for a **Free trial**
version or see your local retailer.

Inside

“Just-in-time reviews of the hottest new hardware and software,” is how senior editor Brian Nadel summarizes *PC Magazine*’s First Looks section. A look at this issue’s section will bear out that description. The opening article—a comparison of newly announced

home PCs from Hewlett-Packard, IBM, Sony, and Toshiba—demonstrates Brian’s commitment to provide what no other computer publication does or can: Labs-based comparative reviews of the most exciting products, just as they hit the market.

Brian points to his “deep-seated curiosity about what’s best

ers, editors, and art and production personnel, as well as the efforts of dozens of contributing editors and freelance writers. Anchoring Brian’s team are staff editors Melissa Perenson and John Morris, editorial assistant Mary Paulson, and copy editor Gerard Mackey.

To support the team’s mission, we’ve reinvigorated the First Looks section by expanding the opening review and redesigning it to accommodate *PC Magazine*’s trademark Editors’ Choice award and comparative features tables. We’ve also extended our editorial deadlines and tightened up production to make sure you get the most timely information possible. The First Looks



team demands no less. “Our schedule changes on an hourly basis, depending on what product is available when,” explains Brian. “As soon as something’s ready to ship, we run with it.”

Above all, Brian keeps the team focused on delivering the most current product information into the hands of millions of hardware and software buyers—no matter who they are. “I’m going to be buying a new PC soon,” Brian says, “so this information hits home.”—*Jake Kirchner*

and why” as the driving force behind First Looks. Now in his fifth year at *PC Magazine*, Brian first came aboard to run our PCs team, which evaluates hundreds of new desktops, laptops, and servers every year. So he’s no stranger to our Labs-based testing and evaluation process.

The huge task of testing, analyzing, and writing up the dozens of new products appearing in First Looks every issue requires the work of many Labs staffers, writ-

PC Magazine, ISSN 0889-8507, is published twice a month except in July and August, for \$49.97 for one year. Ziff-Davis Publishing Company, L.P., One Park Ave., New York, NY 10016-5802. Periodicals postage paid at New York, NY 10016-5802 and at additional mailing offices. POSTMASTER: Address changes to *PC Magazine*, P.O. Box 54093, Boulder, CO 80322-4093. GST registration number: R-123669673; in Canada, R140496720. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 266477.

PHOTOGRAPH BY THOM O'CONNOR



Nothing is more uncomfortable than discovering your server is too small.



You buy a server, your company grows; you buy another server, your company grows. It's time to break this vicious cycle.

Introducing the Sun™ Ultra™ Enterprise™ Servers. The mainframe-caliber servers designed to grow as your company grows—without the usual cramps or compromises. Whatever your business needs, whether it's multiple-terabyte data warehouses or the ability to support thousands of users, Sun delivers. Best of all, you'll never wake up crammed in to a corner. Modular, scalable design lets you add CPUs and pump up I/O bandwidth as needed. Redundant, hot-swappable components, along with round-the-clock service and support, deliver the reliability to keep your mission-critical applications up and running. All of which adds up to enough network computing power to cover your entire business, no matter how quickly it grows. Sun Ultra Enterprise Servers. They're every reason you bought a mainframe, and every reason you didn't. To learn more, contact Sun at <http://www.sun.com> or call 1-800-786-0785, Ext. 390.



NEW
WINDOWS 95

Version Now
Available!

MAKES ALL RETYPING OBSOLETE.



OMNIPAGE PRO: THE WORLD'S MOST ACCURATE OCR.

Step one: Scan a document.
Step two: Press a button to
convert that document into
editable text and images for
your favorite applications.

WHAT'S NEW IN OMNIPAGE PRO FOR WINDOWS 95

- Microsoft Office Compatible
- Integrates with your favorite image editor
- New easier-to-use AutoOCR Toolbar™
- Read faxes directly from Microsoft Exchange
- Automatic OCR scheduling
- HTML output jump starts moving pages to the Web
- OLE 2.0 support, and more



Sound easy? It is. OmniPage® Pro is the world's most accurate Optical Character Recognition (OCR) software, turning your scanned pages into usable, editable text and graphics in seconds.

So now you can accurately enter your letters, faxes, reports, even articles into Word, WordPerfect, Excel, Lotus 1-2-3, PageMaker and many other applications without ever having to type a single word. OmniPage Pro is now available for Windows 95 and

Windows 3.1. Which means that—no matter which operating system you use—you can take complete advantage of the most accurate OCR

software in the world today.

Call us now to order a copy of OmniPage Pro, or simply visit a local reseller.

And then you can really start using your scanner for all it's worth.

“OmniPage Pro is the longtime OCR leader for good reason. It's simple, fast and the most complete package around.”

PC Computing—December 1995



SPECIAL UPGRADE

\$129*

If you have any OmniPage or WordScan product, including those bundled with your HP or other scanner, upgrade to OmniPage Pro for these benefits:

- 65% more accurate
- 35% faster
- New, easier-to-use interface
- True Page® retains text & graphics in their original layout



74%
off
regular
price

Visit a local reseller
or call today!

800-736-5735

extension 10

[www.caere.com]

*Suggested price US dollars—subject to change without notice. Caere, the Caere logo, OmniPage, WordScan and True Page are registered trademarks and AutoOCR Toolbar is a trademark of Caere Corporation. All other names are the property of their respective holders. © 1996.

CIRCLE 292 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

UP FRONT

Inside

Just-in-time reviews4

Letters

Computing Java19

Trends

- ▶ Power paging
- ▶ LCDs on your desktop
- ▶ Combatting Internet-borne viruses
- ▶ A Netscape spinoff31

Pipeline

Identifying suck-ups, and other management secrets37

First Looks

- ▶ Net2Phone
- ▶ FloorPlan Plus 3D
- ▶ Web search engines: Excite and HotBot
- ▶ Domino Web server
- ▶ Tally T7070 ink jet printer
- ▶ EchoSearch39



The latest in home PCs: Style, performance, and a little television (page 39).

Second Looks

A kinder, gentler PointCast73

COLUMNISTS

Michael J. Miller

From the Editor-in-Chief29

Bill Machrone

The End of Common Experience85

John C. Dvorak

The Digital-TV Disaster87
Inside Track89

Jim Seymour

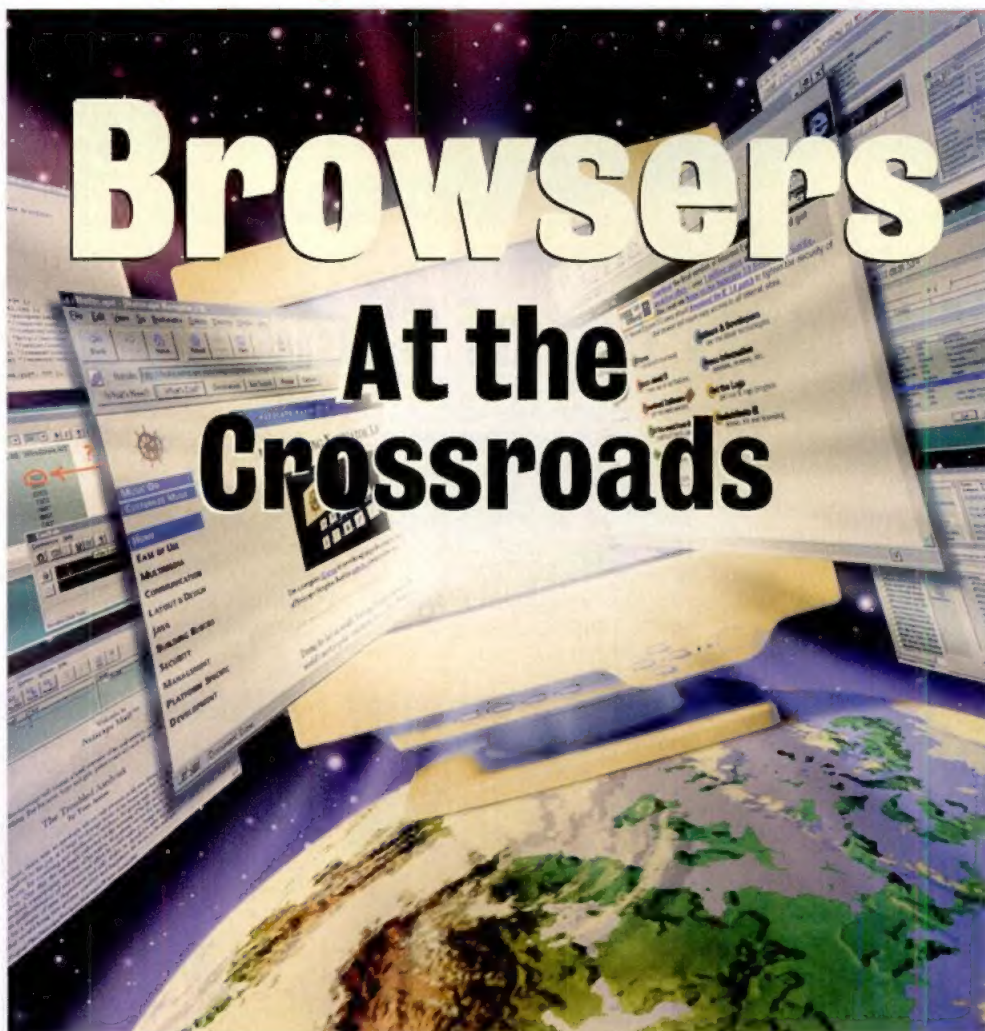
Windows NT Revisited93

Bill Howard

PC Banking Benefits95

COVER STORY

Netscape Navigator vs. MS Internet Explorer



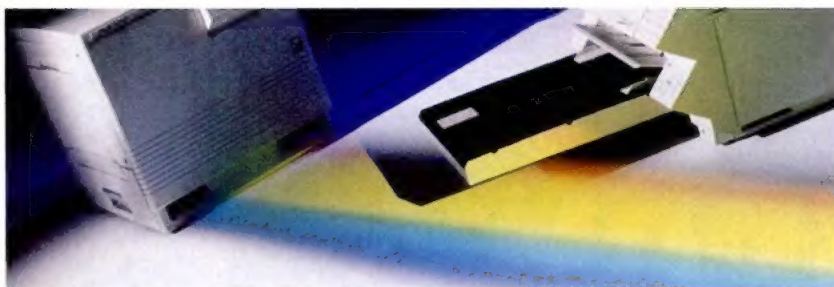
BY MICHAEL J. MILLER, THOMAS MACE, AND AMARENDRA SINGH Out of the scores of browsers available today, only two really matter: Microsoft Internet Explorer 3.0 and Netscape Navigator 3.0. Which browser is the easiest and most flexible to use? Which performs the fastest on a network and over modems? Which offers the best text rendering and the richest programming features? Which one should you choose? Our tests provide an in-depth analysis of the browser, mail, news, and collaboration features of both hot new releases100

Editors' Choice103
End-User Features105
Due This Fall: The Next

Browser Generation108
Webmaster Features112
Developer Platforms119

Performance Tests129
Collaboration Tools130
Mail and News139

FEATURES



Color Printers

A Spectrum of Choices

BY M. DAVID STONE Colorful documents have gained popularity in everyday business use. Presentations and reports make a better impression in color, and graphic arts professionals can now produce handsome color comps at a lower cost. In this feature we look at the range of color business printers with image quality and speed to suit any office or graphics activity. The ten color laser printers we review deliver the clear text business users have come to expect, with color to make dazzling reports and presentations. For the graphics pro, we review four ink jet and eight thermal dye transfer models designed to deliver striking, near-photographic output for color image proofs and artwork.....141

LASER PRINTERS150	Xerox XPrint Plus 4920.....177	Tektronix Phaser 240.....186	Tektronix Phaser 440, 480X.....195
Digital Colorwriter LSR 2000.....150	INK JET AND THERMAL WAX	THERMAL DYE PRINTERS187	A Color Printer for Every Need142
HP Color LaserJet 5M.....150	PRINTERS179	Eastman Kodak	Editors' Choice143
IBM Network Color Printer.....162	Epson Stylus 1500.....179	Digital Science 8650 PS.....187	Glossary146
Lexmark Optra C.....167	Epson Stylus Pro XL.....179	Fargo Electronics Pictura 310e.....188	Guide to Color Output154
QMS magicolor CX/40.....167	HP CopyJet M.....182	Fargo PrimeraPro.....188	Performance Tests170
QMS magicolor WX.....167	HP DeskJet 1600 CM.....182	Mitsubishi S3600-40U.....192	Summary of Features182
Tektronix Phaser 350, 550.....175	Lexmark Color Jetprinter	Mitsubishi S6600-40U.....192	Shinko ColorStreams:
Xerox XPrint Plus 4915.....177	4079 Plus.....183	Seiko ColorPoint 835 PS.....195	Two More Contenders188

Application Servers

The Power Of Four

BY BILL KATZ Quad-processor Pentium Pro-powered servers have arrived, and they're ready to take on the enterprise, formerly a space dominated by \$100,000+ RISC boxes running Unix. These servers have all the necessary hardware to run in an upscale, demanding enterprise environment, including an abundance of hot-swappable and redundant components as well as voluminous memory and disk capacities. They're also highly manageable, with hardware and software solutions designed to keep them up and running whether you're close to your server room or miles away. We test eight four-way Pentium Pro application servers running Windows NT Server 3.51 with our industry-standard test suite ServerBench 3.0.....197



ALR Inc.199	Editors' Choice199
Austin Direct.....202	Suitability to Task200
Compaq Computer Corp.215	Price/Performance Index202
Data General Corp.216	Sharing the Wealth207
Digital Equipment Corp.216	Solutions for Managing
Hewlett-Packard Co.223	Your Server212
NEC.....226	Performance Tests218
Unisys PC Division.....227	Summary of Features224

AT HOME

Multiplayer Gaming



Two or More Is War

BY MICHAEL E. RYAN Want to learn more about the Internet's killer app? Then be sure to check out our roundup of online gaming services. We cover four that let you play the hottest action and strategy games against foes in your area and around the country. We also take a close look at multiplayer gaming over LANs and its effect on network traffic. Grab your shotgun and load up on atomic health—you're not going to want to miss this!.....337

DWANGO.....339	Online Fun for Kids343
Kali.....343	The Local Multiplayer
Mplayer.....350	Connection346
Total Entertainment	Free Net Gaming?353
Network.....356	In the On-Deck Circle356

PC TECH

Java Speed Trials

BY RICHARD V. DRAGAN AND LARRY SELTZER
Our Java performance test suite JMark 1.0 reveals the strengths and flaws of today's Java environments. Find out whose virtual machine and just-in-time compiler executes Java applets fastest.....229

Tutor

BY JEFF PROSISE From Easter eggs to system monitor: A mixed bag of topics prompted by you, the readers239

Inside Windows 95

BY BARRY SIMON Let Windows answer the phone: Voice-enabled modems, TAPI, and SVD promise powerful telephony241

Internet Tools

BY NEIL RANDALL A look at HTTP—the protocol that drives the World Wide Web245

Utilities

BY DOUGLAS BOLING Power to the right click! MenuEdit makes customizing context menus a snap249

PC SOLUTIONS

User-to-User

BY NEIL J. RUBENKING Dropping files on a .BAT file in Windows 95; adding a rooted Explorer view choice to folders' context menus.....253

ASK OUR ADVISORS

Hardware

Why a monitor may be turning itself off; running a Windows system with a CGA monitor; what to do when a new case disables your system.....264

Operating Environments

Setting a default font for Write in Windows 3.1; adding external viewers to OS/2 Warp's WebExplorer; processing environment variables in a FOR loop269

Word Processing

Why your WordPerfect files containing graphics double in size each time you update them—and how to avoid this272

Spreadsheets

Why entries ending in the letter E may not work the way you'd expect in 1-2-3 for Windows276

Databases

Toggling between U.S. ZIP codes and Canadian postal codes in your Microsoft Access forms; making sure the date format fits your FoxPro application276

NETWORK EDITION



Cover Story

Follows page 96

- LAN AnalyzersNE1
- ▶ Century LAN Analyzer.....NE7
- ▶ LANalyzer for Windows 2.2.....NE10
- ▶ LANdecoder 3.0.....NE14
- ▶ Sniffer Network Analyzer 5.0NE20

First Looks

- ▶ Microsoft Windows NT Server 4.0.....NE25
- ▶ Web CommanderNE26

Multiple Access

- BY STEVE BUEHLER
- The Sky Is FallingNE30

PC MAGAZINE BEYOND PRINT



WHAT'S NEW ON THE CD

Pentium Classic: Still the One

Interactive reviews of over 100 Pentium machines, from 120- to 166-MHz CPUs.

Create Your Own Web Site

Everything you need to create a Web site, from HTML authoring software to database tools to servers.

Portable Property

Full-motion videos and customizable charts help you select the right notebook.

Adapting to Online

See how online services embrace and complement the Web using our video reviews.

Gamer's Guide

Video reviews of the 25 hottest PC games in four categories.

Utilities and software: MultiLaunch associates more than one application with a file extension, Hotkey Detective lists hotkeys in use, InCtrl 3 lets you track system changes, RUPL adds programs to your Windows 95 Start menu, and Quod tests your gaming strategy.

A full year of *PC Magazine* in searchable format.

To order, call 800-335-1195 in the U.S. and Canada or 303-665-8930 elsewhere.

AFTER HOURS

Abort, Retry, Fail?

BY DON WILLMOTT.....366



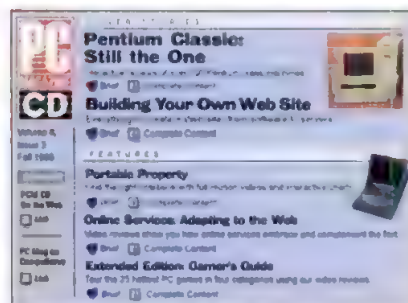
A strange solicitation arrives in the daily mail.

ALSO IN THIS ISSUE

PC Direct.....	253
PC Magazine Marketplace.....	298
Premier.....	298
Classified.....	319
BusinessCard.....	334
Reader Service Card.....	315
Advertisers' Index: Companies.....	361
Advertisers' Index: Products.....	362
Coming Up.....	364
Editorial Product Index.....	365

WHAT'S NEW ONLINE

With all the Internet-related software available on the Web, it's sometimes difficult to decide what you really need. Here's the solution. Visit our entirely redesigned InternetUser and find out about the latest browsers, plug-ins, Internet utilities, and development tools before you download. To tell us what you think about InternetUser, send a message to Tin Albano at talbano@zd.com.



Think
of it as
a box of
crayons.

From the 23rd century.



PHOTO QUALITY

With 720 x 720 dpi your documents won't just be smart, they'll be brilliant.

The future is looking bright. Brilliant, actually, with the EPSON Stylus Color 500 ink jet printer.

Imagine. 720 x 720 dpi for true Photo Quality color. Laser-quality black text. Dazzling color

printing at fast print speeds on virtually any media. And simple start-up with our Easy Setup software. With our free award-winning  (loaded with full-version Adobe and Sierra software), you can create striking presentations and reports for work. Or birthday cards and banners for fun. All with a two-year

CALL 1 800 GO EPSON
ASK FOR OPERATOR 3100

warranty for just \$289 (not bad, since the Color Pak's worth up to \$299 alone). Visit us at <http://www.epson.com> for even more reasons why the EPSON Stylus Color 500 is truly ahead of the competition. And ahead of its time.

LASER
QUALITY up.

Black text that won't break up—even when it's blown up. See?

YOU'VE GOT TO SEE IT IN **EPSON** COLOR.



Editor-in-Chief Michael J. Miller

Editor Jake Kirchner

Executive Editors Rick Ayre, Bill Howard, Gail Shaffer, Don Willmott

Executive Director, PC Labs C. James Galley III Art Director Laura Baer

Senior Networking Editor Frank J. Derfler, Jr.

Senior Editors Leon Erlanger (Networking and Communications), Thomas Mace (Internet, PC Tech), Brian Nadel (First Looks), Sebastian Rupley (West Coast)

Managing Editor Paul B. Ross Research Manager Judy DeYoung

Senior Associate Editors Carol Levin (Trends), Sharon Terdeman (Technical Columns), Lance N. Ulanoff (Software) **Associate Editors** Jamie M. Bsales (Hardware), Michael E. Ryan (After Hours), Todd Spangler (Networking and Communications), Carol Venezia (PCs) **Assistant Managing Editor** Kim Schueler **Production Editor** Monica Sirignano **Copy Chief** Glen Boisseau **Becker Staff Editors** Holly Aguirre, Mary E. Behr, Yvonne Koulouthros, David R. Lambert, David Lidsky, Ellyn J. McCasland, John Morris, Michael W. Muchmore, Melissa J. Perenson, Sarah L. Roberts, Michelle Schoenung, Anush Yegazarian **Senior Writer** Robert S. Anthony **Staff Writers** Angela Hickman, Cade Metz **Senior Copy Editor** Joseph N. Levine **Copy Editors** Jennifer Golub, Regina Y. Kwon, Jill Léger, Gerard Mackey, Josh Miller, Ann Ovodow **Production Manager** Patricia Perkowski **Layout Manager** Linda Harms **Senior Layout Editor** Lillian Gaffney **Layout Editor** Barbara McGeoch **Production System Support Analyst** Nancy Goodman-Slayback **Librarian** Nancy Sirapyan **Library Assistant** Dolores Williams **Editorial Researchers** Jennifer Anderson, Andrew Boscardin, Robert Daly, Simon T. Eskow, Josh Levy, Arie Moller, Jeremy Olshan, Eyal Rabinovitch, Richard S. Shim **Editorial Assistants** Laura Lindhe, Mary Paulson **System Support Manager** Craig Ellison **Network Support Analyst** Melvin Acevedo **Communications Manager** Diana Garelik **Assistant to the Editor-in-Chief** Tara Solon **Assistant to the Editor** Rita Aprahamian **Assistant to the Executive Editors** Christina M. Evelyn **Administrative Assistant** Christina Okang **Synop, PC MagNet** Ken Hippie

Contributing Technical Editor Neil J. Rubenking **Contributing Editors** Bill Machrone (Editorial Director, New Products), Douglas Boling, Padraic Boyle, Bruce Brown, Brian Butler, Sheryl Canter, Ray Duncan, John C. Dvorak, Michael J. Mefford, Edward Mendelson, Charles Petzold, Stephen W. Plain, Tony Pompili, Alfred Poor, Jeff Prossie, John R. Quain, Sal Ricciardi, Steve Rigney, Winn L. Rosch, Joe Salemi, Jim Seymour, Richard Hale Shaw, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone

Senior Associate Art Director Richard Demler **Associate Art Directors** Charles Conover, Vera Naughton, Michael Scowden **Assistant Art Director** Le Chau (Betty) Thai **Associate Graphics Director** David Foster **Graphic Artist** Mark Tyner **Assistant to the Art Director** Frieda T. Smallwood **Contributing Photographer** Thom O'Connor

Director, PC Labs, West Coast Steve Buehler **Technical Directors** Ben Z. Gottesman (Software), Nick Stam (Hardware), Larry Seltzer (Internet, PC Tech) **Director, Operations** John R. Delaney **Project Leaders** Richard Fisco (PCs), Jeff Mace (Graphics/Hardware), Jay Munro (Internet, PC Tech), Robert Norton (Network Edition), Jeffrey G. Will (Networking and Communications) **Associate Project Leaders** Laura Cox, Dan Smith **Programmers** Richard V. Dragan, Kenneth Prakobchart **Product Testing Manager** Charles Rodriguez **Technical Analysts** Russell Iwanchuk, Amy Leung, Margaret A. Piemonte, Rick Rovegno, Denis Tom **Support Technicians** Bruce Deodat, Andrew Go, Oliver Kaven, Melanio Lopez, Jacqueline Paredes, Mark Valentine, Kevin Young **Inventory Control Coordinators** Bryan Hughes, Rob Graydon, William Pagan

PC MAGAZINE CD

Executive Editor Peter McKie **Art Director** Curtis M. Fields **Associate Editor** Jae Yang

PC MAGAZINE ONLINE

Managing Editor Diane D'Angelo **Web Designer** Albert Larew **Associate Editor** Tin Albano **Senior Technical Editors** John Clyman, Amarendra Singh **Technical Associate** Thomas W. Giebel **Staff Writer** Karen J. Bannan **Assistant Editor** Tracy Reppert

Publisher Nancy Newman

National Associate Publisher Peter Longo **National Sales Director** Vickie Pinsky **Business Manager** Andrew J. Cole **Business Analyst** Christine Holsten **Events Manager** Dawn Gudelis **Manager, Promotion and Public Relations** Lynne Hasluck

Senior Advertising Production Manager Susan Conrad **Advertising Production Manager** Robert Joy **Assistant Advertising Production Managers** Barbara Adams, Ivis Fundichely **Editorial Production Manager** Pamela J. Berkowitz **Coordinator, Editorial Production** Louise Laberge

Advertising Office: One Park Ave., New York, NY 10016-5802; 800 33 MAG AD, 212-503-5100

Ziff-Davis Publishing Company Chairman and CEO Eric Hippeau

Presidents Ronni Sonnenberg (U.S. Publications), Jeffrey Ballowe (Interactive Media and Development Group), J.B. Holston III (International Media Group), Bob Brown (Computer Intelligence/Infocorp), William Rosenthal (Training and Support Publishing Group) **Vice-Presidents** Timothy O'Brien (Chief Financial Officer), J. Malcolm Morris (General Counsel and Secretary), Rayna Brown (Human Resources), Daryl R. Otte (Planning), Roger Herrmann (Production), Mark Moyer (Controller) **Treasurer** Thomas L. Wright

U.S. Publications Group

Presidents Ronni Sonnenberg (U.S. Publications), Claude Sheer (Business Media Group), J. Scott Briggs (Consumer Media Group) **Senior Vice-Presidents** Lawrence C. Burstein (Consumer Advertising), Baird Davis (Circulation) **Executive Vice-President, Business Media Group** Don Byrnes **Vice-Presidents** Tom McGrade (Business Manager), Jim Manning (Marketing Services), Bob Bader (Central Advertising Sales), Mark Van Name (Product Testing), James F. Ramaley (Circulation Services), Al DiGuido (Group Publisher), Daniel Farber, Michael J. Miller, Paul Somerson **Executive Director, Licensing** Gertrud Borchardt **Director, ZD Labs** Bob Kane **Director, Benchmark Operation** Bill Catchings **Ziff-Davis Magazine Network: Vice-President/Managing Director** Joe Gillespie **Executive Director** Alicia Saribalis **Marketing Director** Mike Perkowski **Directors** Ken Beach, Michael Bird, Jeff Bruce, Kelly Lowman, Melinda Maginn, Debbie Moss, Julie Tuttle

Interactive Media and Development Group

President Jeffrey Ballowe **Executive Vice-President** David Shnaider **Executive Vice-President, Internet Publishing Group** Daniel Rosensweig **Vice-President, Business Development** Tom Thompson **Vice-President, Editor-in-Chief ZD Net** Daniel Farber **Vice-President, General Manager ZD Net** James Savage **Vice-President, ZDTV** Richard Fisher **Vice-President, Creative Services** Herbert Stern **Vice-President, Research** Elda Vale **Editorial Director, New Products** Bill Machrone **Group Business Manager** Jocelyn Grayson **Director, Public Relations** Gregory Jarboe

Ziff-Davis Publishing Company A Softbank Company

Subscription Inquiries, Address Changes

Subscription Services: For subscription service questions, address changes, or ordering information, call 303-665-8930 in the U.S., 303-665-8930 in Canada, or 303-604-7445 elsewhere. You can send faxes to 303-604-7455, or 303-604-0540 outside the U.S. Or write to *PC Magazine*, P.O. Box 54093, Boulder, CO 80322-4093.

Subscription Rate: The subscription rate is \$49.97 for a one-year subscription (22 issues). Canada and all other countries, please add \$36.00 for postage.

Back Issues: For back issues (subject to availability), \$8 per issue (\$9 outside the U.S.), send check or money order to Back Issues Dept., Ziff-Davis Publishing Company, P.O. Box 53131, Boulder, CO 80322-3131.

PC Magazine CD: *PC Magazine CD*, the interactive CD-ROM companion to *PC Magazine*, is available quarterly. To order (\$49.95 per year in the U.S., \$72 in Canada, \$99 elsewhere), please call 800-335-1195, or 303-665-8930 outside the U.S. and Canada. Or write to *PC Magazine CD*, P.O. Box 59494, Boulder, CO 80322-9494.

Customer Lists: We periodically make lists of our customers available to carefully screened mailers of quality goods and services. If you do not wish to receive such mailings, please write to us at *PC Magazine*, P.O. Box 54093, Boulder, CO 80322-4093.

BuyerLink: Additional information on advertised products can be requested online at www.pcmag.com/BuyerLink.

How to Contact the Editors

We welcome letters. However, we cannot look up stories from past issues, recommend products, or diagnose problems with your PC by phone. Send your written questions, complaints, and compliments to *PC Magazine*, One Park Ave., New York, NY 10016-5802. Please include a daytime telephone number. Send electronic mail to [CompuServe address 72241,104](mailto:pcmag@zd.com), to Internet address pcmag@zd.com, or to PC MagNet (see below). *PC Magazine's* general number is 212-503-5255. The West Coast Operations number is 415-378-5500.

If you are dissatisfied with a product advertised in *PC Magazine* and cannot resolve the problem with the vendor, write (do not call) Beatrice Olivas, Advertising Department, at the above address. Include copies of your correspondence with the vendor.

PC Magazine does not accept unsolicited manuscripts. We will pay \$50 for Solutions and Programming user tips and for Abort, Retry, Fail? submissions. If you submit artwork or clippings with Abort, Retry, Fail?, mark up a photocopy, not the original.

PC Magazine Online

PC Magazine is on the World Wide Web (www.pcmag.com) and The Microsoft Network (Go To pcmagazine), and it operates PC MagNet, an on-line service of ZD Net, hosted by CompuServe. To join PC MagNet, call 1-800-895-4596 and ask for the PMZ offer, or set your communications software for 7 data bits, even parity, 1 stop bit, and full duplex. To find the number nearest you, dial 800-346-3247. (In Canada, dial 800-635-6225, voice only.) At the Host Name prompt, enter PHONES. Follow the menus, note the number closest to you, then hang up and dial the number. At the HOST NAME prompt, enter CIS. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASSWORD prompt and PCMCIS95 at the ENTER AGREEMENT NUMBER prompt. When you join ZD Net, you will be enrolled in both ZD Net and CompuServe, for a charge of \$13.45 a month. The connect-time charge is \$2.95 an hour, billed by the minute. For member services, call 800-848-8990.

To obtain the current utility on PC MagNet, type GO ZNT: FREEUTIL. You can also obtain it from our World Wide Web site, or you can download it from our anonymous FTP server at ftp.pcmag.zd.com. You can receive the free utility on-disk by faxing your request to 508-368-0141.

Permissions, Reprints

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article or use *PC Magazine's* logo in conjunction with an Editors' Choice designation, write Chantal Tucker or fax her at 212-503-5475; for information on reprints, please contact Ziff-Davis Reprints at 800-825-4237.

Editorial and Business Office: One Park Ave., New York, NY 10016-5802. Editorial: 212-503-5255; Advertising: 800 33 MAG AD, 212-503-5100.

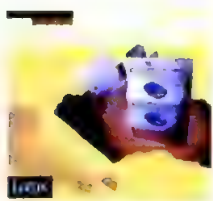
The following are registered trademarks of Ziff-Davis Publishing Company: DOSMark, NetBench, PC, PC DIRECT, PC Labs, PC MAGAZINE, PC MAGAZINE AWARD FOR TECHNICAL EXCELLENCE, PC MAGAZINE EDITORS' CHOICE, PC MagNet, ServerBench, WinBench, Winstone, and ZD.

The following are trademarks of Ziff-Davis Publishing Company: Abort, Retry, Fail?, After Hours, BusinessCard, Corporate Developer, CPUmark, Extending Your Apps, Features Plus, First Looks, First Looks Plus, Lab Notes, New & Improved, OFF THE STACK, PC Bench, PC Magazine At Home, PC Magazine CD, PC Magazine Marketplace, PC Solutions, PC Tech, Pipeline, Power Programming, Quick Clips, Read Only, ScreenDemos, Tech Notes, Tutor, User-to-User, WinDraw, ZDigit, ZD Net, and ZiffNet.

Other trademarks and trade names used throughout the publication are the property of their respective owners.

Except where noted, all *PC Magazine* reviews are of currently available products.

Copyright (c) 1996 Ziff-Davis Publishing Company. All rights reserved. Reproduction in whole or in part without permission is prohibited.



Approach
THE SIMPLE POWERFUL DATABASE

Sometimes it takes a
few trophies before true
excellence
is recog-

nized. Case in point: Lotus
Approach.[®] Since its intro-
duction, Approach has
garnered more than 50
database awards, and is
applauded by novices,
programmers, and yes,
even the critics. No other
database has garnered so
much praise by so many
different audiences. Ever.

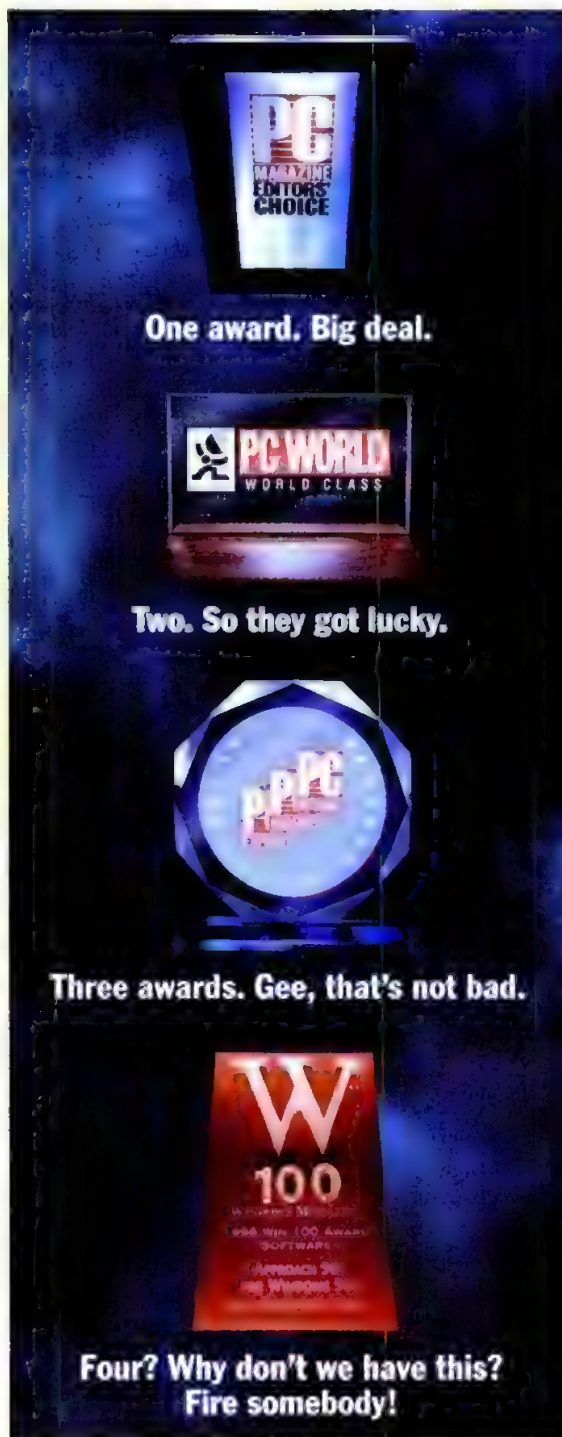
Approach is in a league
of its own when it comes
to usability. Or as PC
World put it, "*Approach*
was our usability testers'

favorite, hands down." Its award-winning
user interface guides users with ease through

queries, report building, analyses, charts,
and much more. Working with data simply
couldn't be easier.

But don't let Approach's
superior ease of use fool
you. Approach satisfies
the power-hungry user as
well, with robust program-
ming tools for building
sophisticated, custom
business solutions – fast.
PC Magazine recently called
it "*a great combination of
simplicity and power.*" No
wonder the trophy case is
getting crowded.

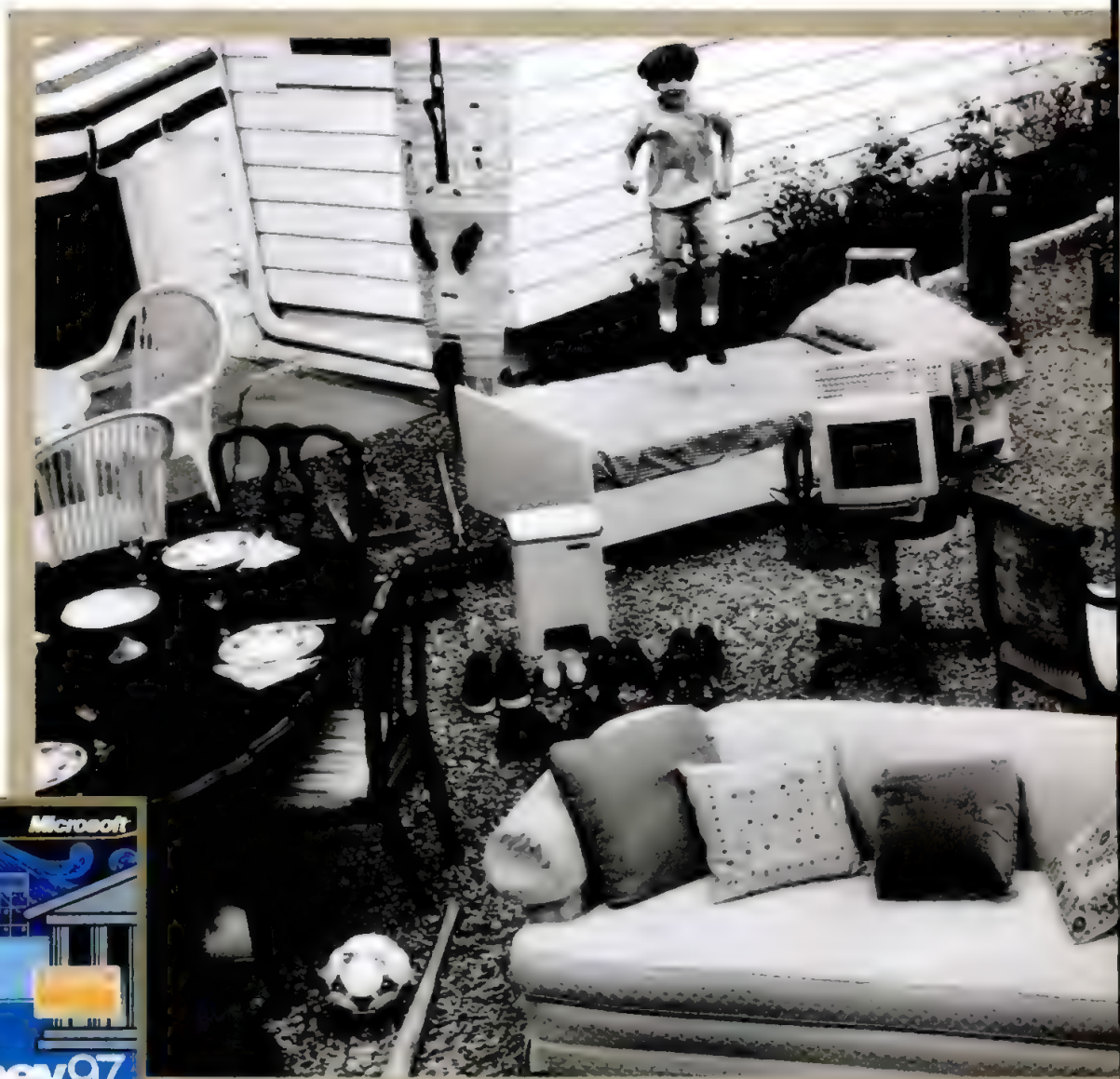
Find out for yourself
why Lotus Approach is
the critics' choice. Call
1-800-TRADE-UP, ext. C277



to order. Or visit our web
site at www.lotus.com.

Lotus
Working Together[®]

Spare us your



Want to manage your finances by computer without having to type in each transaction? With Microsoft Money Online Banking, all it takes is a few mouse clicks. Just click on the online banking icon, and all the information you need can be entered electronically. So instead of keeping everything in your messy drawer, download your latest statement and balances. (Even your Quicken files can be imported automatically.)

Paying bills is just a click away. Money Online Bill Payment lets you pay virtually any business or individual in the U.S. or A, regardless of who you bank with. The paper bill shows up on your monthly statement the same way as the check you now write.

The screenshot shows the Woodgrove Bank website. At the top, there is a navigation bar with links for Home, About Us, and Contact Us. Below this, the WGBBank logo is prominently displayed. To the right of the logo is a small graphic of a building with the text 'CBS News 60' and 'and for web site'. Below the logo, there is a list of links: Home, About Us, Contact Us, and a link to 'View Account Information'. At the bottom of the page, there is a footer with the text '© 2007 Woodgrove Bank. All rights reserved.' and a link to 'Privacy Policy'.

Bank Statement Clearing Statement		Statement date: 12/31/06		
		Clearing balance: 1,260.00		
Bank	Customer	Payment/Description	Payment	Payment
12/31/06		CHL 1 (PMT) CCL 1 (AMORTIZATI)	900.00	
12/31/06		C. Banca di Legn	\$70.00	
12/31/06		C. COMPONIRE CINE DIT		\$220.25
12/31/06		Salario - 12/01/06 - 11/12		51.50
12/31/06		BB1 - PMT 1101 - BODS CLS01	\$25.00	
12/31/06		A.720 Interest credit		\$170.00
12/31/06		11/01 - 11/01/06		\$140.00
12/31/06		C. Transact. C. C	\$22.00	

1. need to
 2. need to
 3. need to
 4. need to
 5. need to

Microsoft
Where do you want to go today?™



*NEC Doesn't
Have It.*



*Sony is More
Expensive.*

Come see us at

COMDEX
Fall '96 Las Vegas Convention Center
Booth No. 1490



TECHNITRON



free



MAG Innovation Co., Inc. • 2801 South Yale St., Santa Ana, CA 92704 • TEL 800-827-3996 or 714-751-2008 • FAX 714-751-5522 • MAGIC FAX-On-Demand: 714-751-0166
©1996 MAG Innovation Co., Inc. All rights reserved. The following are trademarks of their respective companies: MAG Innovation and Technitron of MAG Technology Co., Ltd.; Colorific
MultiSync™ XE15 and XV17+ based on information published by the manufacturers of those monitors as of 8/26/96. Actual price may vary. Specifications subject to change
through 12/31/96 for end users (\$49.95 retail value) included with monitor purchase.

MAG-nified performance MAG-nificent color MAG-Technitron™

Forget NEC and Sony. Your best value in hi-res color monitors with an advanced Trinitron® CRT is Technitron from MAG InnoVision.

VERTICALLY FLAT — superb image quality and reduced distortion.

ULTRA FINE 0.25mm APERTURE GRILLE — super sharp focus and definition. The unique technology enhances brilliance and contrast to levels other monitors can't match.

MAG InnoVision DX15T	Sony Multiscan® 15sf II	NEC MultiSync® XE15	MAG InnoVision DX700T	Sony Multiscan® 17sf II	NEC MultiSync® XV17+
					
13.9"	13.9"	13.8"	16"	16"	15.6"
MSRP \$399	ESP \$479	ESP \$575	MSRP \$799	ESP \$799	ESP \$849

**Viewable. (All Technitron monitors include: EPA Energy Star compliant power management; SWEDAC MRP II compliant low emissions; 3-year Limited Warranty; award winning service (extended service plans optional); recyclable packaging; and no CFC's used in manufacturing.)

MICROPROCESSOR - based digital controls deliver unrivaled flexibility with Plug & Play ease for Windows® 95 compatibility.

NEC's MultiSync® XE15 and XV17+ don't have it. Sony's Multiscan® 15sf II and 17sf II are more expensive. For the best value in Trinitron® color CRT technology — buy Technitron from MAG InnoVision. Discover why monitor buyers across the country are switching to Technitron — from MAG InnoVision. **Call 1-800-827-3998 ext. 161** for the MAG InnoVision Authorized Ultimate Reseller near you.



MAG
INNOVISION



800-827-3998
www.maginnovision.com

© 1997 Sonnetech, Ltd.; Kodak Color Management Software of Eastman Kodak Company; Trinitron and Multiscan of Sony; MultiSync of NEC Technologies, Inc.; Windows of Microsoft. Guidelines for energy efficiency. Comparisons of prices and specifications of the MAG InnoVision DX15T and DX700T, the Sony Multiscan® 15sf II and 17sf II, and the NEC MultiSync® XE15 and XV17+ without notice. *All uses of Trinitron® refer to CRT technology only. The DX700T and DX15T use a Trinitron® CRT. Free Colorific Color Management Software.

Circle 167 on Reader Service Card

The Office of the Future—Today!

Offering the world's most innovative business software and a new dimension in power, functionality and Internet support, Corel® Office Professional 7 is the *first* office suite that allows you to publish to the Java™ Language using Corel Barista™ technology. Imagine having the ability to publish all of your existing files, exactly as they appear, to the World Wide Web. Finally, technology that delivers Web pages the way you envisaged them. No more pale imitations. No more programming. No more re-formatting. Just stellar Web documents.

Corel Office Professional 7 gives you all this plus the most robust set of industry-leading business applications available in an office suite. And for added convenience, you'll find that all core applications are compatible with most competitive software. Go beyond traditional document creation. Experience tomorrow's office software—today!

COREL Office Professional 7

Corel® WordPerfect® 7

WordPerfect's extensive cross-platform compatibility is a must for optimum enterprise-wide communications. Corel® WordPerfect® 7's innovative new features, exclusive tools and superior Internet support continue to make it the word processor of choice for any office.

Plus Value-Added Features and Applications!

CorelDRAW™ 6 illustration module - an incredibly fast and powerful graphics application
 CorelFLOW™ 3 - for high-impact business graphics
 Sidekick™ 95 - an innovative personal organizer
 Corel® Time Line® - the ultimate project management software
 Netscape Navigator™ Internet browser
 Dashboard™ 95 - desktop application launcher
 InfoCentral™ 7 - a powerful database information manager
 Corel® A to Z - an extensive electronic reference tool
 Envoy™ 7 - a versatile electronic document publisher
 Corel Barista™ technology (in Corel® WordPerfect® 7, Corel® Quattro® Pro 7 and Corel® Presentations™ 7)
 Quick View Plus® - view over 200 document formats
 IBM® VoiceType™ Control (core applications only)
 1,000 top-quality fonts
 10,000 clipart images with full-color reference guide

Corel® Quattro® Pro 7

Analyzing and presenting data has never been more intuitive! With more @ functions than the competition, file compatibility with Lotus® 1-2-3® and Microsoft® Excel plus extensive Internet connectivity, Corel Quattro Pro 7 is simply the most comprehensive spreadsheet available.

Paradox® 7

Paradox® 7 delivers a winning combination of ease of use, performance and powerful application development—plus ultra-smooth integration with Corel® WordPerfect® 7 and Corel® Quattro Pro® 7.

Corel® Presentations™ 7

When you need to inform, educate or persuade, Corel® Presentations™ 7 will put the Internet to work for you—it's an incredibly effective way to convince your audience.

\$199⁰⁰*

Competitive upgrade
CD-ROM version

\$299⁰⁰*

Full CD-ROM
version

COMPUTER

1-800-THE-CITY
1-800-843-2489

Call for
direct connect
to your
nearest store.

*US\$ plus applicable taxes and shipping

Corel, WordPerfect and Quattro are registered trademarks and Presentations, CorelDRAW, Barista, CorelFLOW and InfoCentral are trademarks of Corel Corporation or Corel Corporation Limited. Envoy is a trademark of Novell, Inc. Netscape Navigator is a trademark of Netscape Communications Corp. Paradox is a registered trademark of Borland International, Inc. Sidekick and Dashboard are trademarks of Starfish Software Inc. Time Line is a registered trademark of Time Line Solutions Corporation. IBM is a registered trademark and VoiceType is a trademark of IBM Corporation. Quick View Plus is a registered trademark of BSO Corporation. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. All other company and product names are trademarks or registered trademarks of their respective corporations.



Corel, Official World Title Sponsor
of the COREL WTA TOUR



<http://www.wordperfect.com>
 Call now for faxed literature!
 1-613-728-0826 ext. 3080
 Document # 1176



COREL WORLD, U.S.A.

October 20-23, 1996, Baltimore/Washington D.C.

U.S.A. event for CorelDRAW™, Corel VENTURA™ and Corel PHOTO-PAINT™ users.

Hands-on workshops, product showcases, plus chances to win valuable prizes!



Letters

JAVA AND THE FUTURE OF COMPUTING

Concerning John C. Dvorak's column in the June 25 issue of *PC Magazine*: Java was designed as a platform-independent language for decentralizing networked applications. With Java's platform independence, a user, processor, and operating system can use the same application code. If users can have the functionality of a Java applet on any machine, they can choose their next computers based on cost efficiency and performance instead of worrying about compatibility.

YONAH WOLF
via the Internet

While I agree that decentralization has been a major computing trend of the last decade, it is not to the exclusion of centralized services. Mainframes, for example, are still a vital component of information systems in big business. The Internet is most certainly a decentralized phenomenon that relies very heavily on centralized services, and it is within this context that Java will play a key role.

RICHARD ENG
Toronto, Ontario, Canada

As usual, Dvorak has missed the boat. Five years ago the PC was going to replace the mainframe and minicomputer. Well, here we are and mainframes are still around, minis are still here, and pretty soon the Internet terminal will be here too.

STEPHEN NORTON
via the Internet

All praise to Dvorak for pointing out that Emperor Java has no clothes. Java probably will find a comfortable niche somewhere, but to suggest that it heralds a new era of computing staggers the imagination.

MARK FINKEL
via the Internet

Regarding Dvorak's point about a mass exodus from the current model of complex, application-oriented desktop computing, I wish he'd snap out of it. Java code doesn't execute from a centralized server somewhere in cyberspace but is executed on the user's desktop. In this way, each user can rely on his or her own CPU's power and ability to run the common code for a particular application.

KAMEAHA AWEOKAPONIA
via the Internet

Where Dvorak goes completely wrong is in his assertion that Java will never be used for anything other than small applications. The media have focused on Java as a Web-related language, but it is actually more appropriate for building large systems. It is not only possible to build such applications in Java, it is con-



I don't see Java as a long-term success, but by today's standards it's far from being a loser.

siderably cheaper to do so than to use C/C++, and nothing drives adoption like saving money.

JIM FROST
via the Internet

Dvorak speculates that Java will be replaced in Microsoft's plans by a Visual Basic variant because Microsoft is "a company known for language development." The C and C++ languages were not developed or designed by Microsoft, yet they are the most commonly used languages for commercial Windows applications. So when the dust settles, with or without Microsoft's support, Java could ultimately replace C/C++.

MILO M. MARTIN
via the Internet

Java serves as an easy networking language, with its main focus on embedding applications in Web pages. And for that purpose it is the way to go. Other networking tasks can be achieved using more robust and efficient languages, such as C or PERL, but as far as Web publishing and small networking projects that emphasize ease of programming and portability are concerned, Java performs its task well and facilitates the programmer's work dramatically. I don't see Java as a long-term success, but by today's standards it's far from being a loser.

PEDRO SANDER
via the Internet

RECIPE FOR A CONTRIBUTION

With the complicated nature of programs today and the explosive growth online, it is

hard for anyone to keep up. I don't expect perfection, but I do expect better than what the PC industry currently delivers. I think *PC Magazine* can help by expanding the Second Looks section with reports on software that doesn't work as advertised. If less emphasis were placed on flashy new stuff and more on usability, the mind-set of the industry might shift from being feature-intensive to quality-intensive.

FRANK BILLINGTON
Calgary, Alberta, Canada

LOVED IT, HATED IT

I want to congratulate you on your review of 101 Pentium PCs, "Pentium Classic: Still the One" (June 25, 1996). I thought that it was very complete, and I agree with your Editors' Choice pick of the Micron Millennia 166. I have the same machine at home and find it to be a solid and good performer. I would have liked to see a review of server machines, though, even if it was just a short section based on printing tests.

JOHN WESTGATE
Chenango Falls, New York

See "The Power of Four" in this issue, a review of quad-Pentium Pro application servers.—Ed.

I feel you missed an important flaw in your review of the Micron Millennia 166. The power management features include the option of monitoring the processor fan. However, enabling this feature issues a false report that the fan failed when the machine boots up and forces the CPU to run at approximately 18 MHz. It took me almost a full workday and over an hour with Micron technical support to discover this.

WILLIAM COLLAR
via PC MagNet

Maybe I missed something, but if the Pentium and Cyrix CPUs are pin-compatible, why haven't I seen a comparison of the two done by swapping chips in a computer rather than by comparing totally different systems with each other?

DARYL LEBEAU
via the Internet

Although it is pin-compatible, to run properly the Cyrix processor requires a different BIOS from the one implemented in Intel chips. Swapping chips to create a phantom machine will not help our readers make a sound decision based on what's actually available on the market.—Ed.

PC THERAPY

Having been a critic of *PC Magazine* benchmark tests in the past, it seems only fair that I

^T^H^E
POWER
of
NOVELL
UNLEASHES
^T^H^E
POWER
of
INTRANETS

When we created IntranetWare™, we designed it to work with your current Novell® network. IntranetWare is merely the next evolution of NetWare®—so you keep the server operating environment you know and love. ✂ But you're upgrading it to the most perfect and powerful intranet/Internet solution on the market: with highly advanced file, print, and directory services, the strongest levels of security,

INTRODUCING INTRANETWARE.
IT EFFORTLESSLY UPGRADES YOUR NETWARE
TO A FULL-SERVICE, INTRANET PLATFORM
WITH INSTANT INTERNET ACCESS.
WHAT ELSE DO YOU WANT?

the fastest, full featured Web Server—and instant access to the Internet with IP, an IP/IPX gateway and a multi-protocol router, all in an environment that is open to emerging standards. ✂ So you can look at other, less advanced, solutions that will force you to wreak havoc with your system. ✂ Or you can call an old friend. Novell.

For more information on IntranetWare call 1-800-638-9273

www.novell.com/intranet_ready

IntranetWare

Novell®
Everything's Connected.™

Letters

give credit where credit is due. I did an analysis of your data for 101 Pentiums and found that your ZD Graphics WinMark 96, ZD Disk WinMark 96, and ZD CPUmark₁₆ are excellent predictors of real-world performance as measured by ZD Winstone 96.

JOHN NAVAS
Dublin, California

The benchmark tests of 101 Pentiums omitted some important information that past tests have covered. Specifically, you leave the reader in the dark about how many PCI or ISA slots are available. What good is a hot-rod Pentium that has little or no room for future expansion?

JOSEPH BROOKS
via the Internet

SAME OLD, SAME OLD

I was disappointed with your recommendation of Broderbund Software's 3D Home Architect in the At Home story "Do-It-Yourself Design" (June 25, 1996). This is the same disk-based version that's been out for years, just transferred to CD-ROM. The commands are archaic, the video clips are a waste of time, and as far as I can tell, Broderbund has made no changes to the program at all.

GREG GUINOTTE
via the Internet

THE YELLOW PAGE ROAD

Your First Looks review of Internet Yellow Pages Web sites, "Web Yellow Pages Let Your PC Do the Walking" (July 1996), was right on the money. However, you failed to mention the "Big Book Directory Search"

HOW TO CONTACT US

We welcome your comments and suggestions. Please send Letters to the Editor via

THE INTERNET pcmag@zd.com

COMPUSERVE 72241,104, or to individual editors as listed on ZD Net (type GO PCMSTAFF)

FAX 212-503-5799

MAIL Letters, PC Magazine, One Park Ave., New York, NY 10016-5802

All letters become the property of PC Magazine and are subject to editing.

We regret that we cannot answer letters individually. To send submissions for PC Solutions, please see the sidebar "How to Contact Us" on the second page of that column.



CORRECTIONS AND AMPLIFICATIONS

The description of Micron Electronics' Home MPC P200 (New & Improved, September 10, 1996, page 78) should indicate that the system's Diamond Stealth S3 Virge 3-D 2000 graphics card comes with 2MB of EDO RAM, not VRAM as stated in the text.

(www.bigbook.com), where I have frequently been successful after failing to find what I wanted at other Yellow Page sites.

LANNY BENDER
via the Internet

DEDICATED TO YOU

Bill Howard's column, "PC Reliability: Perception vs. Reality" (July 1996) suggests that vendors that have not achieved a grade of A rating for their repair record have built a "reservoir of goodwill" that keeps their customers coming back. It is more than that. When a Gateway 2000 representative is willing to spend whatever time it takes to solve my problem and does it with respect for me, then I will willingly return to the same vendor for future products no matter what the ratings indicate.

JOHN E. KASZA
Midland, Michigan

I bought a \$3,000 machine from Gateway because I got the latest technology for the best price. One huge factor in my decision was PC Magazine's ratings.

DAN RODE
via the Internet

You missed one point that may explain why people rate a product highly when the numbers don't support it: pride of ownership. Few people are going to admit that they made a bad decision in their purchase whether it is a car or a house or a computer. This can hold true even when a person is having nightmare problems with a product.

LOUIS WAGNER
via the Internet

The three vendors Howard cited as having the highest approval ratings also offer attractive price/performance ratios on their equipment, an inducement to power users and experienced computerphiles. While new users are often attracted to companies because of long warranty periods and bundled software, experienced users are less likely to have a major problem and are more likely able to fix it themselves with a little advice or a quick part replacement.

WESLEY M. ALLISON
via the Internet

INTERFERENCE ON THE WEB

I cheered Jim Seymour in his quest for "smaller is better, tiny is best" campaign for rational Web page design until he changed his mind and missed the point in his column "The Hands-On Approach to Web Design"

(July 1996). The problem is not access speed to the Web but transmission time through the Web. Our LAN is connected directly to the Internet, yet I am frustrated every time I try to load a Web page bloated with graphics. No matter how fast my connection to the Internet, all those packets still have to travel over already heavily burdened nodes to get to me.

DUSTY SOMERVILLE
via the Internet

ALWAYS A STEP BEHIND

Michael J. Miller's column "Why Buy a Perfect PC?" (July 1996) hit home with me. In 1994 I finally got enough money to buy what I thought was the "perfect PC," a 486DX2 system with 16MB RAM and the latest DOS and Windows versions available. I thought this system would last me about five years. Two months later the Pentium processor was released, and last year it was Windows 95. Now I see that with all these changes it is nearly impossible for the average person to keep up.

JAMES L. RIDGWAY
via the Internet

REMOTE RENOVATIONS

I found your review of remote-control software, "Friendly Takeovers," to be very timely and insightful. However, you gave your Editor's Choice Award to Stac's ReachOut, and while technically it may be a wonderful product, I find its customer service very poor. I think you should take customer support into consideration.

GARY D. NITZKIN
Farmington Hills, Michigan

You covered Windows 95 and Windows NT products but seemed interested only in compatibility when it came to Windows 3.x. It would have been helpful to know how these packages rate for those of us still using Windows 3.x.

PAUL G. BRANDON
via the Internet

WAIT AND SEE

In his Inside Track column of August 1996, Dvorak states that "Internet phones have zero impact on real long-distance services." I'm getting tired of his sweeping predictions. The Internet phone is only months old publicly and hasn't been in practice for more than a year within any private organizations. Technology takes time to trickle down the ladder.

DANNY VALLI
Denver, Colorado

**Introducing the new 100Mbps Ethernet PC Card.
Wave to your co-workers with the push mowers.**

We're not suggesting that you buy one of our new 10/100 PC Cards in the interest of petty one-upmanship. Buy one because it's the only way to connect a notebook to 100Base-TX Fast Ethernet networks.

The CreditCard Ethernet Adapter 10/100 comes in two versions, *Ready* and *Upgradable*. The *10/100-Ready* senses your network speed and adjusts itself automatically to both 10Mbps and 100Mbps networks. And, if you'd like to move to 100Mbps Fast Ethernet in the future, we offer the *10/100-Upgradable* for the price of 10Mbps. It



*The CreditCard Ethernet Adapter
10/100-Ready Intro Kit for \$199.00**

connects at 10Mbps now and upgrades to 100Mbps with the simple addition of a new cable. Both are compatible with a wide variety of networks, including NetWare, Windows 95 and Windows NT, and offer Xircom's 30-day money-back compatibility guarantee. To find out more, visit our Web site at www.xircom.com/100a. Or give us a call at 1-800-882-2953 and order a CreditCard Ethernet 10/100 Intro Kit.

Before one of your co-workers does.

Xircom

The Mobile Networking Experts.

GET DESKTOP POWER WITH NEW-FOUND FREEDOM.



Modular Bay #2

Modular Bay #1



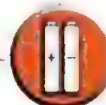
8X CD-ROM



Second
hard drive



3.5" floppy drive



Second lithium-
ion battery

Take your work soaring to new heights.

With its exclusive FlexOpt™ dual-bay modular design, the **Millennia TransPort™** notebook system from Micron Electronics frees you to mix and match devices for a variety of customized choices. Drop in a modular CD-ROM drive to enhance multimedia capability. Add a second intelligent modular lithium-ion battery for up to eight hours' use without recharging*, or add a 2.1GB hard drive to more than double your storage capacity. And there's built-in flexibility with features like our innovative Pick-a-Point™ system offering touchpad or pointing-stick operation and an infrared port for wakeup, wireless printing from compatible printers. Top it off with the industry-leading Micron Power warranty, and you have the ideal portable computing solution that will allow your imagination to soar.



With up to eight hours' battery life* and full multimedia desktop performance, the **Millennia TransPort™** puts compact, no-compromise computing where you need it.

Micron Power™

Warranty & Support

- 5-year limited warranty on microprocessor and main memory
- 3-year limited parts-only system warranty
- 1-, 2- or 3-year optional on-site service agreement for Micron desktop systems
- 30 days of free Micron-supplied software support for Micron desktop systems
- 30-day money-back policy
- 24-hour technical support

This offering is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.

*Actual battery performance will vary depending on applications and configurations. Based on two 4-hour batteries.



Millennia TransPort™

- 133MHz Intel Mobile Pentium processor
- 16MB EDO memory (48MB max.)
- 12.1" active matrix color display, 800 x 600
- 1.2GB removable hard drive

\$4,399
Business lease \$150/month

- 133MHz Intel Mobile Pentium processor
- 32MB EDO memory (48MB max.)
- Motorola® Montana 28.8 fax/modem
- 12.1" active matrix color display, 800 x 600
- 1.2GB removable hard drive
- 2nd lithium-ion battery

\$5,199
Business lease \$163/month

- 150MHz Mobile Intel Pentium processor
- 32MB EDO memory (48MB max.)
- Motorola Montana 28.8 fax/modem
- 12.1" active matrix color display, 800 x 600
- 2.1GB removable hard drive
- 2nd lithium-ion battery
- Samsonite® leather carrying case

\$5,550
Business lease \$174/month

Standard Features

- Intel Mobile Pentium processor
- Intel 430MX PCI chipset
- 256KB L2 pipeline burst cache
- 8X modular CD-ROM drive
- PCI graphics accelerator, 1MB EDO memory
- Pick-a-Point™ dual pointing devices integrate both pointing stick and touchpad
- Removable EIDE hard drive
- 3.5" modular floppy drive
- Intelligent modular lithium-ion battery
- 16-bit stereo sound
- Built-in stereo speakers and microphone
- 2 Type II or one Type III PCMCIA slots
- S-video and NTSC-video outputs
- Headphone, microphone and line-in jacks
- 2 infrared ports, one front, one back
- Parallel, serial, VGA and 2 PS/2 ports
- Dimensions: 11.7" x 9.4" x 2.0", Weight: 6.9 lbs.†
- Samsonite nylon carrying case
- Microsoft® Windows® 95 and MS® Plus! CD
- Microsoft Office Pro 95 and Bookshelf™ 95 CDs
- Kensington® security lock ready*
- 5-year/3-year Micron Power™ limited warranty

† 6.9 lbs. includes 3.5" floppy and one battery
* Lock secures both Millennia TransPort and MicronDock

Options

- With 150MHz Pentium® processoradd \$200
- With Motorola Montana 28.8 fax/modemadd \$259
- With 3Com® Ethernet 10BT PCMCIAadd \$149
- With Samsonite leather carrying caseadd \$99
- With 2nd modular Lithium-ion batteryadd \$199
- With 2nd hard drive (1.2GB)add \$599
- With 2nd hard drive (2.1GB)add \$699
- With 16MB DIMM module upgradeadd \$349
- With 32MB DIMM module upgradeadd \$749
- With MicronDockadd \$299
- With ExecPacadd \$799



NEW



AUGUST 1996
MILLENNIA TRANSPORT
P.132



International Sales
208-893-8970



International Fax
208-893-7393



Tollfree from Canada
800-708-1758



Tollfree from Puerto Rico
800-708-1756



Tollfree from Mexico
95-800-708-1755

900 E. Karcher Road, Nampa, ID 83687 • Mon-Fri 6am-10pm Sat 7am-5pm (MT) International Sales Hours: Mon-Fri 6am-7pm (MT) 208-893-3434 • Fax: 208-893-3424 • Purchase Order Fax: 208-893-8992 • Technical Support Available 24 Hours / 7 Days • Technical Support E-mail: techsupport@mei.micron.com

©1996 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice; prices do not include shipping and handling. 30-day money-back policy does not include return freight and original shipping/handling charges, applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Lease prices based on 36-month lease. Intel, Intel Inside and Pentium are registered trademarks of the Intel Corporation. Microsoft, Windows the Windows logo and Windows NT are registered trademarks of Microsoft Corporation. All other service marks, trademarks and registered trademarks are the property of their respective companies. PCMG-TRANS-96108

CIRCLE 120 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

MICRON™
ELECTRONICS, INC.

800-295-0546
<http://www.mei.micron.com>

Microsoft Internet Explorer 3.0



Microsoft Internet Explorer

Special Offers

-  The Wall Street Journal Interactive Edition
-  ESPN[®] SportsZone
-  Hollywood Online
-  MTV Online
-  InvestorsEdge
-  And more!

SPECIAL I
MUT
FUN
Quarterly
THE WALL

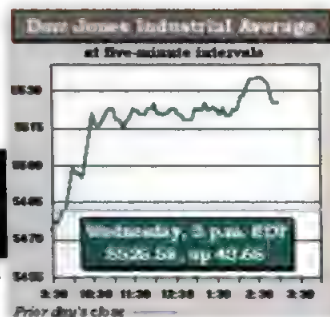
*Connect time charges may apply to all offers.

©1996 Microsoft Corporation. All rights reserved. Microsoft is a registered trademark and the Microsoft Internet Explorer logo and *Where do you want to go today?* are trademarks of Microsoft Corporation. The Wall Street Journal[®] Interactive Edition is a trademark of Dow Jones & Company, Inc. ESPN is a trademark of ESPN, Inc. SportsZone is a trademark of Starwave Corp. MTV is a trademark of MTV Networks, a division of Viacom International, Inc. Hollywood Online is a trademark of Hollywood Online Inc. InvestorsEdge ©1995 Ethos Corp.

IS YOURS TO DOWNLOAD, ABSOLUTELY **free**,
 COMPLETE WITH **subscriptions**
 TO THE WALL STREET JOURNAL INTERACTIVE
 EDITION AND ESPNET SPORTSZONE,
also free.

PORT
 AL
 IS
 view

WALL STREET JOURNAL.
 INTERACTIVE
 EDITION.



Introducing Microsoft® Internet Explorer 3.0. The new browser that's a step ahead of all the rest. It lets you experience all the coolest content, like sound and animation, that's being developed for the Internet today. It lets you customize the way you access and view the web. And it's yours to download right now, absolutely **free**.* From now through December 31, we have all kinds of special offers that make the experience even better: You get The Wall Street Journal® Interactive Edition, free. It's the web's leading source of business news, with 24-hour updated coverage of world business and deep background on thousands of companies and

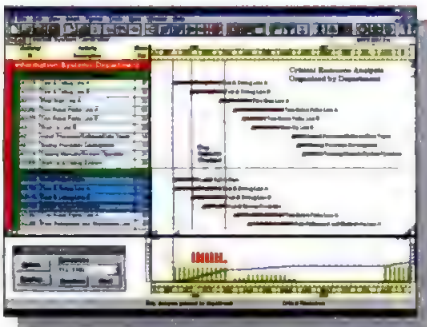
topics. You also get a free subscription to the premium areas of ESPNET® SportsZone,™ the number one destination site on the web, including expert columnists, multimedia highlights, behind-the-scenes reports, in-depth player profiles, and more. Our new browser also gives you free access to "buy, sell, hold" stock recommendations from InvestorsEdge, the Internet's premier financial information service. And there's even special content on MTV® Online and offers on other sites that can only be seen with it. Just go to www.microsoft.com/ie. Then click one button. And see what a real browser can bring you these days.

Microsoft®

Where do you want to go today?

www.microsoft.com/ie

The most powerful project management software just got more powerful.



New Primavera Project Planner 2.0 (P3® 2.0) gives you unprecedented power and flexibility so that the difficult task of managing multiple projects will be a whole lot easier. Now you can manage your resources with a precision never before possible. It's the project management software you've always wanted.

P3 also organizes and analyzes project data in unlimited ways. It has intuitive PERT and bar chart interfaces, so you can *anticipate* problems and evaluate options.

New P3 2.0 delivers automated e-mail updating, rich text reporting and worldwide web publishing for enhancing project collaboration. See what makes P3 the most powerful project management software available—and what makes it even more powerful now.

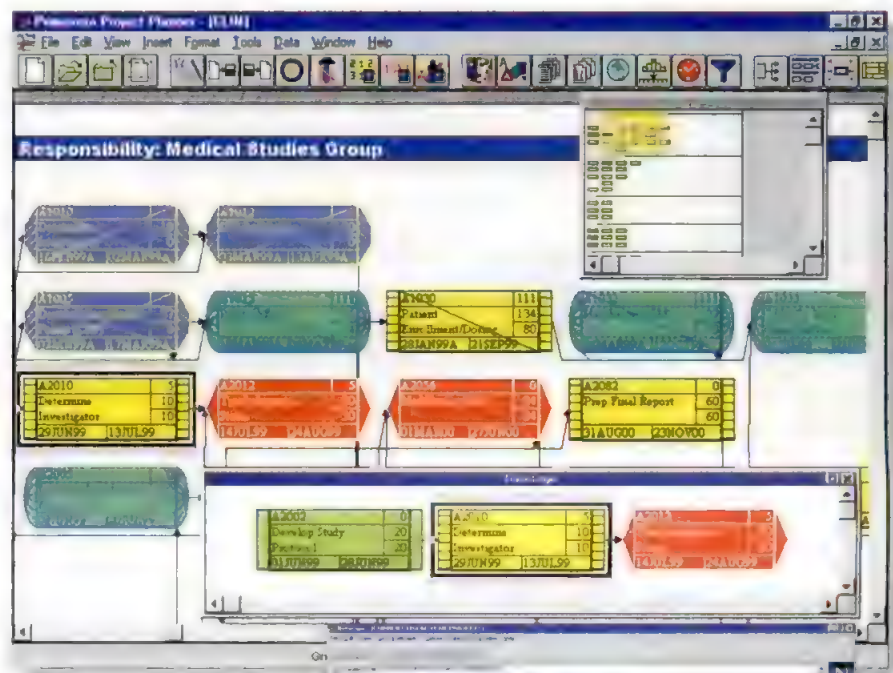


Call for our free new P3 2.0 video: 1-800-584-8080

Two Bala Plaza • Bala Cynwyd, PA 19004-1586 • USA
(610) 667-8600 • (800) 423-0245 • FAX: (610) 667-7894
Internet: sales@primavera.com • www.primavera.com

© 1996 Primavera Systems, Inc.

New Primavera Project Planner® 2.0 helps you manage resources more easily and more intelligently.



PRIMAVERA
How the world says
project management

Resource Loading - Total Monthly Summary

CURRENT FISCAL YEAR PRIORITIES

RESOURCE	WORKER	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
ARCHITECT PM	1	51	119	119	119	119	119	119	119	119	119	119	119	119	119	119
ELECTRICAL ENGINEER	2	13	10	10	10	10	10	10	10	10	10	10	10	10	10	10
MATERIALS ENGINEER	3	20	4	4	4	4	4	4	4	4	4	4	4	4	4	4
PROJECT MANAGER	4	27	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTSC-1000-002 4	5	40	4	4	4	4	4	4	4	4	4	4	4	4	4	4

If the Shoe Fits...

We don't all look the same, act the same, or have exactly the same interests, so why should we get exactly the same newspaper, choose from off-the-rack clothes, or see exactly the same information on the Web? With the computerized delivery of information

via the Internet, PC technology allows information providers to customize content to suit our individual tastes and interests.

In general, that's a great development. Mass customization, as this process is known, offers us the chance to get products and information that more closely meet our needs. The concept isn't new. PC vendors have been selling custom systems direct for some time. Now this concept has come to the Web, in the form of sites that can be customized to your personal needs or that can learn about you as you surf.

For instance, there are several sites where you can set up a personal page with your favorite news areas, weather forecasts, sites, and comic strips. Checking your customized page is not a bad way to start your day on the Web. Alternatively, you can get similar information downloaded continually, through a service like PointCast. At a more detailed level, many sites let you customize the news based on the specific companies or topics in which you're most interested. And some sites track where you go, so that they can lead you to other sites or products of interest to you.

In general, I really like the idea of mass customization. After all, one of the great advantages of computers has always been that they allow us to be original. But there are potential drawbacks to mass customization as well.

One that's received much attention is the question of privacy. Those profiles we fill out or that are created when programs track what we do make it easier for marketers to target us and to distribute advertising. I sometimes find targeted ads to be quite valuable. But I don't want a program tracking what I do without my permission, I don't want my personal information sold without my having a say in it, and I certainly don't want my in-box flooded with the electronic equivalent of junk mail.

Another problem is that often these sites do a pretty poor job of finding the material you really want. Oh, they do collect the material you ask for—and then some. Often, though, you get mostly wire-service stories—many simply rewritten press releases.



BREAKING NEWS

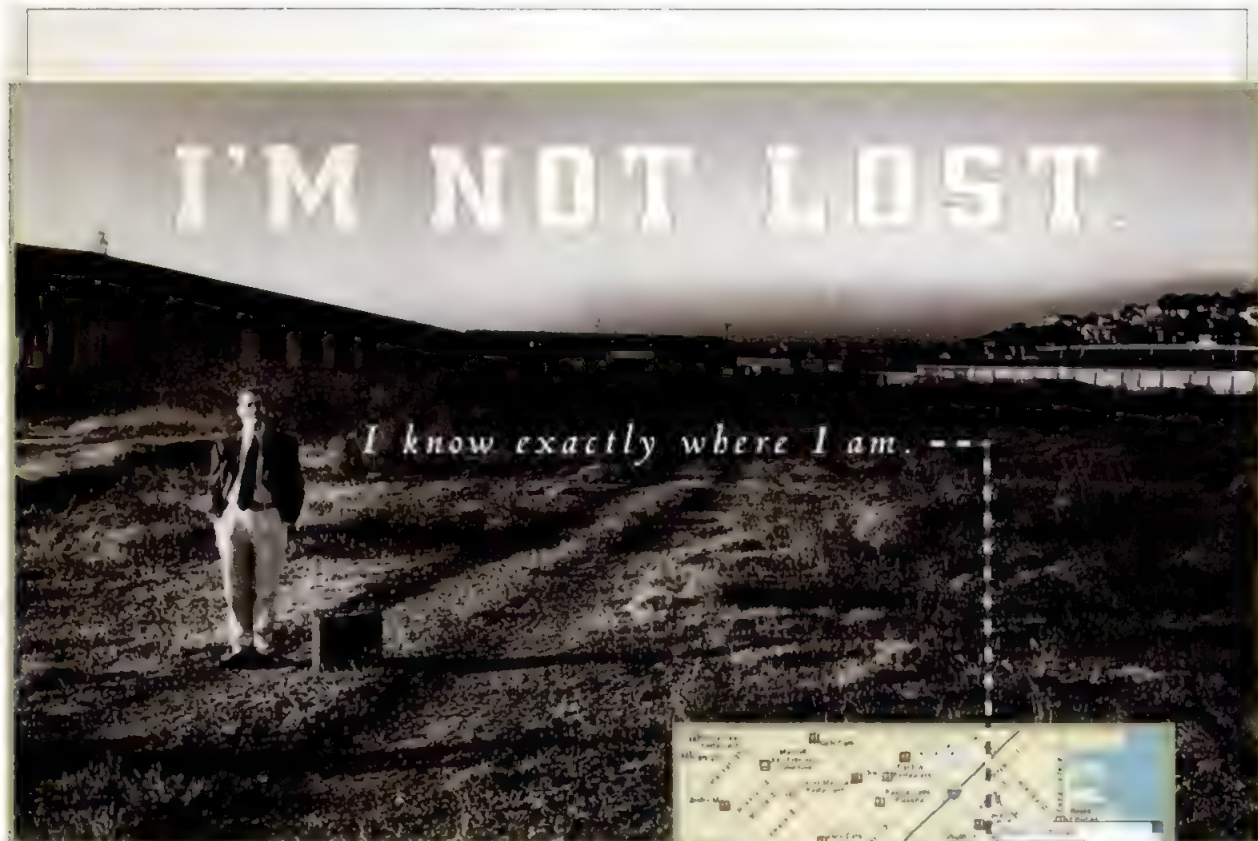
In the long run,
customized
information will
be important.
But there's still a
long way to go.

The other thing these sites lack is spontaneity. The publications I read regularly constantly surprise me with some piece of information I wasn't expecting, or some product that catches my eye. And that's why I'm convinced that even when the kinks are worked out of the system, we'll still want mass-market news sources to supplement our customized information.

Nevertheless, I'm convinced that in the long run, customized information and customized products will play important roles in our lives. But there's still a long way to go—as I've learned firsthand. You may have seen a recent story in the popular press about a store called Custom Foot. Employees measure your feet using photographs and computer imaging and generate a profile, which is then used to make custom shoes for you—for much less than what custom shoes normally cost. A Dateline segment contrasted it with a neighboring traditional shoe store. As it happens, I live near both of the featured stores. Since the concept of mass customization appealed to me, I decided to give the new place a try.

In late March, I had myself measured, and the salesperson told me the shoes would be made to my measurements and delivered in about three weeks. In mid-June, the shoes finally arrived. They didn't fit. I went back to the store, where I was told I needed to see the Director of Foot Relations (no joke). He checked the measurements, told me the employees had made a mistake in entering my order, and had a salesperson measure my feet again. Six weeks later, I received a variety of different pairs of shoes in the mail, but none fit correctly. Finally, Custom Foot said there was nothing more it could do and returned my money. The salespeople were nice about this, but the bottom line was that the shoes just didn't fit.

While waiting for my shoes to arrive, I'd also gone to the traditional shoe store. In minutes, I walked out with a pair of shoes. These were just plain, off-the-shelf shoes, and not at all high-tech, but they fit. The same is true of my news. When I sit back on the train each morning and pick through the morning paper, I realize that it fits pretty well, too. □



I'm 1.4 miles away from a tantalizing corned beef sandwich at the Fly Trap Restaurant. 15 minutes from just the right bed at Anna's Tree Bears, and 1.3 miles away from making over a deal at Ashton Design.



When faced with the realization of being hopelessly lost, most members of the human race will staunchly resort to denial. Happily, Microsoft® Automap® Streets Plus - Deluxe Edition is about to eliminate the problem of losing one's bearings.



Locate an establishment, listing of restaurants, and hotels no matter where you are.

Now, the traveling businessperson can pinpoint virtually any address in the United States on over 6 million miles of road. Maps can be personalized with Pushpins to mark important clients, personal contacts, and new business prospects.

Add to that Web links to the Internet, capabilities to import your contact lists as well as American Yellow Pages' 14 million

listings, and you're looking at the business tool that could give anyone a competitive edge, not to mention a keen sense of direction. Experience more of the Automap products at www.microsoft.com/automap.



Also available: Microsoft Automap Trip Planner, the ideal way to plan your next weekend getaway or family vacation.

Microsoft
Where do you want to go today?™

Trends

TRENDS & TECHNOLOGIES SHAPING THE PERSONAL COMPUTER MARKET

Power Paging

New operating system targets pagers.

Motorola has made a bid for leadership in the two-way wireless market with the announcement of Memos, an ambitious, client/server-based messaging platform. Memos, which capitalizes on Motorola's dominant position in the paging technology market, provides both a complete operating environment and an open development environment.

As Motorola competes for the lead in the mobile hand-held computing arena, the company maintains a rigorously communications-centric focus. This is clearly an attempt to leapfrog PDA makers, which have recently been scrambling to reposition their general-purpose computing devices as communicators.

"From the very beginning, we approached this as a communications platform, not as a computing platform," says Douglas Kraul, vice president and general manager of Motorola's platform software division. "If you were to do a survey of hand-held operating systems, you would find that none of them address the need for a messaging-centric end-user device. Memos devices are not like the Newton, which is a computer with an adjunct communications plat-

form. Hand-holds like the Pilot and [Microsoft's forthcoming] Pegasus are desktop-oriented. Our focus, by contrast, is messaging."

Motorola recently announced the first device based on Memos, the PageWriter. About the size of Motorola's Tango two-way pager, the 1.1- by 3.7- by 2.8-inch (HWD) PageWriter—ready by the first half of 1997—has a 46-key keyboard, a built-in pointing device, and a backlit screen. The new device, priced at \$399, transmits and receives via Motorola's ReFLEX paging protocol.

Memos is "targeted for use in economical, battery-operated wireless communications products ranging from pagers to cellular phones," according to Motorola. The client software will include a user interface, a suite of applications, and a development environment called Memos Script.

Motorola predicts that Message Manager, used to create and view messages, will be the primary application. The Information Browser, another core application, will provide built-in HTML navigation. "I think HTML capability could be a huge opportunity," says Ira Brodsky, president of Datacomm Research. "With



PAGewriter:
Motorola's new pumped-up pager will offer wireless Web access and lots of messaging options.



phone number and an e-mail address. Messages are subject to processing according to rules specified by the subscriber. Among other functions, rules can allow the collection of e-mail from diverse sources. Rules can also be predicated on message attributes, such as priority, subject, or content.

In addition, the Memos Server will process messages so that they can be appropriately received on a given device. If a subscriber dictates a rule that a fax, say, be received on a Memos-enabled cellular phone, the text will be automatically translated to synthesized speech so it can be received on the target device.

Motorola hopes that Memos will, in Kraul's words, help "the industry start blossoming, out of its humbler beeper roots, and into full-fledged communication." PDA makers like Apple, with its increased emphasis on the Newton's online features, have a head start in that direction. Motorola continues to market the Marco, based on the Newton, and the Envoy, based on General Magic's Magic Cap PDA platform.

But PDAs with added wireless communication technology tend to be "bulky and expensive," says Datacomm Research's Brodsky. He also points out that "smart phones" from companies like AT&T and Nokia represent another—albeit higher-priced—version of the two-way wireless messaging future. Although the eventual outcome is unclear, Brodsky says that, overall, "I don't think a lot of people in the industry realize how significant two-way paging is going to be."

—Jonathan Matzkin

the right kind of interface, you could have several different levels of Net interaction. You could just pull information from a Web page, or you could access information published online specifically for these two-way paging devices. You could also have agent technology proactively seeking information."

Considerable power resides on the server side. "We didn't add the server component as an afterthought," says Kraul. "We intended this from the start to be a client/server architecture. To avoid trade-offs such as functionality versus battery life, we needed to split the platform between client and server," he says.

The Memos Server consolidates e-mail, fax, and voice messages into a single repository. Messages are stored on the server system in a user's personal in-box, which is addressed by a single

©1998 Samsung Electronics America, Inc. SyncMaster, SyncMaster and SyncMaster are trademarks of Samsung Electronics America, Inc. All other trademarks are the property of their respective owners. All Rights Reserved. Photo: David

SAMSUNG

monitors

SAMSUNG

SyncMaster 17GLsi

simply delivers.
at your service.
SyncMaster™ 17GLsi monitor.
simply samsung.

superior image

1280 x 1024 maximum resolution
.26mm dot pitch
digital on-screen controls
15.75" viewable area
user defined color control
UltraClear™ screen coating

reliability

24-hour/7-day live support
3-year warranty
Advanced Replacement Program

value

Colorific color matching software
MacMaster™ Mac® adapter
PowerMaster™ power down software

1.800.933.4110 www.sosimple.com

CIRCLE 046 ON READER SERVICE CARD



Sept. 1995 176Lx



Feb. 1996 60u



May 1996 206Lx



June 1996 176Lx



Partner of the Year
1996



July 1996 176Lx



Summer 1996 176Lx



July 1996 176Lx



Aug. 1996 210Lx



Aug. 1996 176Lx



Aug. 1996 210Lx



1996 E&E
Business
Product Award
Winner
17" monitors

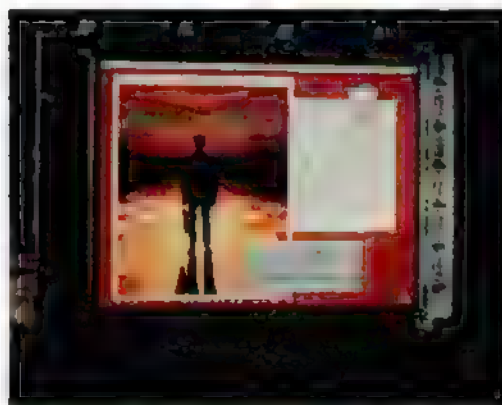
LCDs on Your Desktop

Fact or fiction?

Manufacturers of liquid crystal display (LCD) panels are predicting an imminent and sweeping shift in the desktop monitor market from bulky cathode-ray tubes to slim LCDs. But don't hold your breath for this one.

As one of the industry's largest players—holding a 44-percent share of the \$7 billion LCD market—Japan's Sharp Electronics is heralding the emergence, beginning late this year, of a desktop market for LCDs. Sharp predicts that LCDs may gain 5 percent of the desktop monitor industry by 1997 and that as LCD prices drop to about two times the price of CRT displays, desktop LCDs could leap to about 15 percent of the monitor market.

Some analysts, however, think Sharp and other players—such as Hitachi, IBM, NEC, and Toshiba—are jumping the gun. "Every new technology brings with it a certain amount of hype," says IDC analyst Eric Buckingham, "and LCD technology is no exception." Buckingham thinks that LCD manufacturers are showing a bit too much bravado. "LCD manufacturers do have the ability to put all the pieces together



FLAT-PANEL PROMISES: Manufacturers may be overly optimistic.

and bring about a thriving LCD desktop monitor market by the end of the decade," he acknowledged, "but several obstacles stand in the way."

First, the flourishing notebook industry will inhibit production of the desktop panels for the near future. According to Buckingham, next year's demand for notebooks housing LCD displays will be so huge,

desktop vendors won't have materials left over to make 12- to 18-inch panels for desktop PCs.

Second, technology issues still need to be ironed out, says Buckingham. For example, active-matrix LCDs, which assign a tiny transistor to each pixel, affording better color contrast and wide-angle viewing, require one of two technologies: digital convergence, which converts analog video output to digital signals; or video cards that work with LCD monitors. Both options are problematic. Digital convergence often results in image degradation. And considering the huge installed base of video cards,

LCD-ready video cards are really only feasible for new PCs.

Despite the critics, Sharp officials point to improved LCD production capabilities—in particular, the ability to produce larger pieces of glass more efficiently—and the decrease in LCD prices. Sharp is stepping up efforts to bring products to market and is now developing a 17.7-inch passive-matrix LCD. NEC has also announced 12- and 13-inch active-matrix analog LCDs.—*Angela Hickman*

Combating Net-Borne Viruses

New software gives e-mail the once-over.

Innovative software companies have come up with all kinds of technology to solve the problems the Internet serves up, from weeding out offensive online material to protecting online copyrights. But contracting a virus hidden in an e-mail message remains a hazard of going online.

Developers are now trying to end Internet-borne viruses, and not a moment too soon: After all, one of the notorious virus outbreaks of the 1980s happened over the Internet. More recently, the Concept virus, which attacks Microsoft Word macros, has infiltrated corporate e-mail systems. And in August, the Hare virus was expected to cause more trouble.

Antivirus software can catch viruses once they're on your PC, but one new approach catches the virus at the server, before it

has the chance to infiltrate the corporate e-mail system.

MIMESweeper, from Kirkland, Washington-based Integralis, disassembles incoming messages into components—header, body, and attachments—then decompresses the files and examines the encoding structure of e-mail attachments. The software doesn't check for viruses itself; rather, it turns the files over to whatever anti-virus program is installed on the server.

If the antivirus software gives the e-mail message a clean bill of health, MIMESweeper delivers the message to its intended recipient on the network. If the antivirus software detects a problem, MIMESweeper quarantines the message. The software then generates two e-mail messages—one informing the person who sent the message that it contains a

virus; the other informing the intended recipient that the message has been quarantined.

MIMESweeper can check outgoing messages for viruses, as well as run messages through a "lexical scan" to prevent confidential documents from making their way onto the Internet.

While catching viruses at the server is one way to minimize Internet-borne viruses, what about telecommuters who come and go

from the corporate network? Thunderbyte, of Ontario, Canada, has developed an antivirus product for Microsoft Exchange designed to minimize the chances of inadvertently forwarding virus-infected e-mail messages, whether you're connected to the network or not. Developed by engineering students in the Netherlands, the technology actually simulates the execution of instruction code to check for viruses.—*Carol Levin*



PC Magazine Online Events



WWW.PCMAG.COM. Nothing's more frustrating than spending 20 minutes downloading a plug-in that doesn't do what you thought it would. Here's the solution: Visit **InternetUser** and find out about the latest browsers, plug-ins, Internet utilities, and development tools—before you download. From October 7 to 9, get online and talk to us about Netscape Navigator 3.0 and Internet Explorer 3.0. You can also discuss Web search engines with staff editor John Morris and representatives from HotBot and Excite.

PC MAGNET. From this online service of ZD Net available through CompuServe (GO PCMAGNET), you can download utilities (GO TIPS) and join in discussions about new products (GO EDITOR). **First Looks Plus:** From October 14 to 18, discuss Windows NT 4.0 with reviewer Steve Rigney and Microsoft reps. Also from October 14 to 18, discuss IDT's Net2Phone with reviewer Jon Hill and an IDT representative.—*Tin Albano*

AT ITS PRICE FOR A 100MHz PENTIUM PROCESSOR AND HIGH SPEED CD-ROM, THIS BABY IS MOVING FAST.



EXTENSA 570CDT

- Integrated high speed CD-ROM
- 100MHz Pentium® processor with PCI bus & 256KB L2 cache
- Two Type II or one Type III PC Card slot(s)
- 10.4" SVGA TFT with 1.2GB HDD (570CDT) or 11.3" SVGA DSTN with 810MB HDD (570CD)
- 16-bit stereo sound card, microphone and speakers
- Pre-installed choice of Windows® 95 or Windows for Workgroups®



Introducing the new TI Extensa™ 570CDT. A multimedia powerhouse that won't send you to the poorhouse. Packed into this productivity machine is the latest technology: integrated high speed CD-ROM, powerful 100MHz Pentium processor with full PCI bus architecture for maximized performance, versatile PC Card slots, serial infrared port, 16-bit stereo sound, high resolution SVGA screen, pre-installed Internet browser and much, much more. Catch it while you can by calling 1-800-TI-TEXAS. And start doing extraordinary things. Internet: <http://www.ti.com> E-mail: 2ti@msg.ti.com



 **TEXAS
INSTRUMENTS**

Only one operating system will be allowed on the Extensa notebooks. When you choose Windows 95 or Windows for Workgroups, the other will automatically be deleted. Extensa and "Start Doing Extraordinary Things" are trademarks of Texas Instruments. Pentium and the Intel Inside logo are registered trademarks of Intel Corp. Microsoft, Windows, and the Windows logo are registered trademarks of Microsoft Corp. © 1996 TI
CIRCLE 368 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

Wherever You Go, There You Are

Portable PCs could be the next big market for GPS.

Global Positional System (GPS) technology, which has long been restricted to military and automobile navigation applications, is quickly heading toward consumer electronics and computer-based applications.

Sunnyvale, California-based start-up SiRF Technology is positioning its SiRFstar architecture, which consists of a \$49.95 chip set with software, as an inexpensive way for designers to deploy GPS in portable computers, cellular phones, and hand-held devices. Although SiRF's is not the first GPS architecture to target consumers—several devices were shown at a recent consumer electronics show—the company is betting that a low price will attract more portable makers.

Originally developed by the U.S. Department of Defense, GPS receivers accept spread-spectrum signals at 1.6 GHz from satellites, which can then pinpoint the location of the GPS receiver and plot its location via mapping software. Will Strauss, president of market-research firm Forward Concepts, forecasts a \$10 billion market for GPS receivers by the year 2000. "So far, though," says Strauss, "the receivers have been far too expensive for consumer apps." GPS solutions have also been compromised by inaccuracies caused by signal deflection off of buildings.

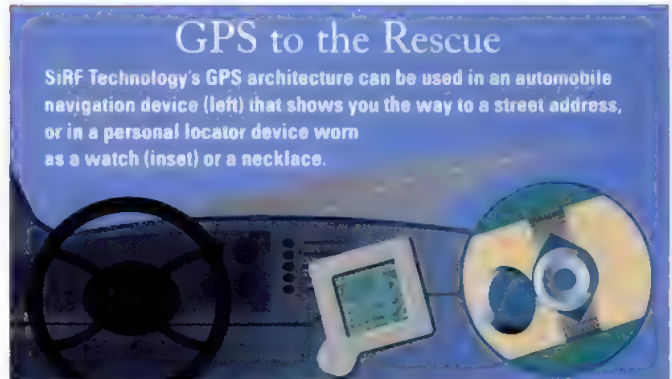
SiRF's chip set, designed to detect these inaccuracies, consists of a receiver that converts a satellite's spread-spectrum signal into digital inputs for a companion digital processor chip.

"Among consumer applications," says SiRF chairman Dado Banatao, "you'll be able to use this technology to locate a lost child, find a car in a

crowded parking lot, or dial 911 from a cell phone, knowing that an operator can locate you."

Banatao is especially focused on the portable PC market. But portable PC makers have been slow to adopt GPS. So far, Mitac is the only manufacturer to support the SiRF architecture.

Part of the problem of gaining GPS acceptance on the PC has come from the lack of standardized digital mapping to serve as a platform for applications. SiRF's software is positioned as such a platform, and its technology is extensible, so



applications built around it can incorporate, say, Multiple Listing Service references for real-estate firms.

SiRF says it hopes to announce software developers and portable PC makers that support its GPS chip set this fall. SiRF

isn't alone in bringing GPS to consumers. Rockwell, which already has a large presence in automobile navigation systems, has a semiconductor division that produces GPS solutions that will compete directly with SiRF's. —Sebastian Rupley

IBM's Corporate Cost-Cutter

Web-ready, networked PCs.

When the idea of a low-cost network computer was introduced earlier this year, skeptics doubted it would fly, for the simple reason that manufacturers couldn't build the machine for less than they wanted to sell it. IBM intends to prove those skeptics wrong with its Network Station, a 2.5-pound Web-ready machine that IBM expects will do nothing less than change the economics of the desktop.

"We can make these devices and make money off them at the target price," says Jim Gant, vice



IBM intends to replace the millions of dumb terminals on desktops today with its \$700 Network Station.

president of integrated workstations at IBM. He points to the drop in prices of DRAM memory chips as one of the factors that keeps costs down.

The \$700 IBM Network Station has no moving parts—no disk drives and no fan. Measuring 8 by 10 by 1.25 inches (HWD), it comes with a PowerPC processor, 8MB to 32MB of memory, a network adapter, a keyboard, and a mouse. (A monitor is extra.) Users can access the Web with Netscape Navigator 3.0, which Navio Communications—a spin-off of Netscape—

will customize. IBM expects to ship the machine in the fourth quarter of this year.

Network Stations can connect to Ethernet and Token-Ring networks and concurrently access OS/2, Unix, Windows NT, and IBM midrange and mainframe computers, as well as Java-based servers and Internet and Lotus Notes groupware applications.

The biggest savings are found not in the up-front cost but in the reduction of maintenance and help-desk overload. "The real advantage of the Network Station," says Gant, "is that it's server-managed, so network managers don't need to install and maintain multiple copies of software on every desktop." A recent Gartner Group survey found that a networked PC costs about \$11,900 annually to own. IBM claims that its new machine can reduce these expenses by 50 to 75 percent.

IBM isn't the first company to launch a so-called network computer. Britain's Acorn Computer Group offers \$500 to \$900 Net-surfer PCs, which use TV sets instead of monitors. Sun River and ViewCall American have also come up with variations on the same theme. Still, the network computer isn't for everyone. Even Gant admits, "A lot of users need PCs and will always need PCs." —Carol Levin

Top Business Software

- 1 **Microsoft Windows 95 Upgrade** Microsoft
- 2 **Coral WordPerfect Suite Upgrade** Corel
- 3 **VirusScan** McAfee
- 4 **Norton AntiVirus** Symantec
- 5 **Microsoft Plus! for Windows 95** Microsoft
- 6 **Netscape Navigator** Netscape Communications
- 7 **First Aid** Cybermedia
- 8 **First Aid Deluxe** Cybermedia
- 9 **CleanSweep 95** Quarterdeck
- 10 **Uninstaller** MicroHelp

*Source: PC Data. Data for July 1996.

By Jake Kirchner

Identifying Suck-Ups, and Other Management Secrets

Now that most of what I do every day involves e-mail, the "real" in-box on my desk rarely produces anything of interest or importance. A recent happy exception was a prepublication copy of Scott Adams' upcoming Dilbert book, *Dogbert's Top Secret Management Handbook*.

Dilbert's latest tribulations and the outrages of his canine companion, Dogbert, the management consultant from hell, won't disappoint fans of cartoonist and author Adams. I laughed at just about every page, but I also got something resembling a headache from all of my wincing. If, like most of us, you're in any way involved in management or are the victim of what passes for management today, this book hits home.

When Dilbert's boss tells him, "Great news! I've reengineered your job to make you more fulfilled. You'll no longer be limited to one little part of the value chain. You'll be involved in all stages of production," Dilbert covers his head and moans, "Oh Lord, you've fired all the secretaries." Dilbert knows he's been "sucked into the boss zone, where time and logic do not apply."

We all know the boss zone. It's the place where the savvy manager concludes that if employees are unmotivated, it's "a sure sign that they don't have a newsletter." Where casual-day dress codes exclude jeans, sneakers, and shorts, "because they are comfortable and attractive and everybody owns them." Where your nonexistent salary increase goes into decorating the executive dining room. Where rumors are considered an excellent way to keep



Why are the cubicles of every software company festooned with Dilbert strips?

employees "edgy and working like bumblebees."

A real-life management consultant recently wrote, in *The New York Times*, that high-tech companies—especially those involved in communications and software—are far ahead of old-line manufacturing companies when it comes to enlightened management.

But if that's the case, how do we explain the fact that Dilbert's creator gets his ideas from his long background in middle management in a telecommunications company? And why are the cubicles of every software company festooned with Dilbert strips?

Thanks to the trillions of dollars we've spent on PCs, spreadsheets, networks, and e-mail, we may be more efficient (we can make more mistakes, faster), better-informed (we spend all day responding to e-mail), and more productive (word processors and spell checkers lull us into thinking we don't really miss all those assistants and secretaries). But the ugly truth is that computer technology has done almost nothing to make anyone a better manager.

"Management technology" is still an oxymoron. We can only hope that technology that really improves our management of high-tech operations is the next great market opportunity. Meanwhile, look for Adams' new book, due out this fall. But be prepared for the reminders on every page that you need more than a management information system to be a better manager—or to be a happy one. As Dogbert notes, also need stock options, parking spaces, free meals, and the opportunity to humiliate those below you."

Netscape Spin-Off

Navio plans to put a browser everywhere.

At a posh rollout in San Francisco recently, Netscape announced that it has formed a company called Navio Communications to incorporate its Navigator Web browser with all kinds of new consumer electronics devices. That independent company—in which Netscape has a major equity position—will focus on Internet-enabling devices such as televisions, phones, set-top boxes, game consoles, network computers, and even cars.

Netscape co-founders Jim Clark and Marc Andree-

sen were on hand to introduce Wei Yen, formerly senior vice president of products and technologies at Silicon Graphics, as Navio's president and CEO. (Clark will be the chairman of Navio). Yen said that "initially the Internet was the domain of universities (.edu) and government

(.gov); while today it is the domain of businesses (.com); and tomorrow, it will be the domain of individuals (.idv)."

Andresen added to that theme with numbers. He sees the total potential user base for browsing software—including 240 million PCs, and counting—as reaching 500 million by the year 2000, once Internet-enabled consumer electronics devices are factored in.

Yen pointed to Navio's vision of several new categories for Internet-enabled consumer devices to take shape over the year to come. The first category, he said, would be TV-centric devices like set-top boxes and game consoles. Yen defined the second category as communications devices, such as PDAs, cell phones, and phone/PDA hybrids. The last category he defined as information terminals, such as kiosks, network comput-

ers, and appliances. Navio's partners so far include IBM, NEC, Nintendo, Oracle, Sega, and Sony.

The idea of marrying an Internet browser with a consumer appliance isn't new. Microsoft championed it at the Windows Hardware Engineering Conference in April, and companies such as Compaq and HP have produced prototypes of Microsoft's "Instant-On," Internet-aware, sealed-case consumer devices. Diba, of Belmont, California, has produced an operating system for information appliances called IDEAs; Diba has formed partnerships with several consumer electronics firms to build e-mail terminals for kitchens, and Internet yellow-pages kiosks for office hallways. And Oracle and Sun Microsystems are pushing their own versions of the network computer.—*Sebastian Rupley*





You can finally get **a modem**
made just for Windows.®

(Of course, you'll have to pay a little less for it.)

O.K. You know where you want to go. Now, how fast do you want to get there?

With the new Winmodem from U.S. Robotics, you actually harness the power of your Windows operating system to fax, check E-mail, and search the net faster and more efficiently than with any other modem.

Not to mention, of course, more affordably.

Plus, unlike other modems, Winmodem gives you the proven compatibility and reliability of Sportster,[®] the number one selling modem in the world. It's easy to install, it's Microsoft Plug and Play certified, and it can be upgraded instantly to 33.6 Kbps with one call to the U.S. Robotics BBS.

What's more, the exclusive U.S. Robotics Connections CD-ROM offers you a wide selection of online products for both home and office.

To learn more about the Sportster Winmodem, or any of the other ways U.S. Robotics takes the limits off how fast you can get what you want, call us at 1-800-DIAL USR, or visit us at www.usr.com.

U.S. Robotics

NO LIMITS

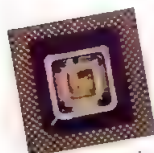
First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

PCs

Home Is Where the PC Is

Computers for entertainment and computing.—By Bruce Brown



The PC isn't just for business anymore, as can be seen in the latest round of high-end home systems from the major vendors. Rather than emphasizing raw processing power and the serious side of computing, these next-generation PCs for the family are for Duke Nukem wannabes, movie mavens, and budding Webaholics. In a very real sense, the PC is continuing to evolve into an all-in-one home computing, communications, and entertainment center.

To get a good idea of the state of the art of the household PC, we gathered four of the most interesting, recently released systems. While these four PCs—the \$3,948 Hewlett-Packard Pavilion 7295V, the \$3,648 IBM Aptiva S74, the \$3,478 Sony PCV-90, and the \$3,548 Toshiba Infinia 7200—have a lot

to offer, they all share a common interface that relies on snappy sound and video but doesn't slow the system down.

Of the four, Toshiba's Infinia is the most highly evolved of this emerging species. The Infinia's design is anything but standard, and its abilities blur the line between PC and TV. Its built-in TV and radio receivers can be accessed via its monitor front panel or its hand-held remote control. And it's the value choice of the bunch.

In addition, Acer, Compaq, and Packard Bell—among others—are also developing so-called convergence systems: mixes of computing and entertainment. But none of these vendors was able to get new models to us in time for this group review. In the coming months, look for these players and others to bring out a new generation of home computers.

This quartet of home-based PCs defines the category of high-end PC: a 200-MHz Pentium CPU, 256K of external cache, either 16MB or 32MB of RAM, a 2.5GB hard disk or larger, 3-D video with at least 2MB of video memory, and a 15- or 17-inch monitor. They all have 8X CD-ROM drives and V.34 modems (capable of either 28.8-Kbps or 33.6-Kbps data throughput).

Using our ZD Benchmark test suite, we tested all four systems with 16MB of RAM and found that there was little separating their computing abilities. But they sacrificed some computing power compared with business-oriented, high-performance Pentium/200 PCs. Comparisons of raw performance miss the point with these PCs, however; they were designed for ease of use as well as fun and games.

For those PCs that came with 32MB of RAM (the Pavilion, PCV-90, and Infinia), we repeated the tests. With 32MB, these PCs were able to eke out an average 24 percent and 16 percent improvement on our Winstone 32 and Winstone 96 tests, respectively. If you're going to process sound, video, and data, you'll want as much memory as you can afford, and 32MB seems to be the sweet spot right

in common, each has its high points and demonstrates its maker's design priorities for the home market. In case cost is a primary consideration, these vendors offer lower-end versions that are several hundred dollars less expensive.

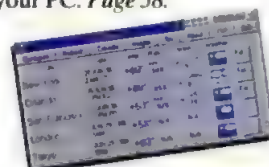
THE PLAYERS AND THE GAME

The HP Pavilion comes loaded with 6MB of video memory for hot 3-D gaming, while IBM's Aptiva does a good job of concealing the business end of the computer with a hide-away system tower and great sound. The Sony PVC-90 features a slick 3-D user in-



INSIDE

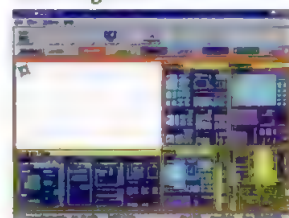
RAIN OR SHINE: WinWeather brings meteorological and forecasting information to your PC. *Page 58.*



THE BIG PICTURE: The Tally T7070 ink jet printer moves low-cost, large-format color printing into the mainstream. *Page 63.*



RECLAIMING DISK SPACE: DiskMapper keeps track of what's where on your hard disk. *Page 52.*



More Products Reviewed...

Excite	48
HotBot	48
Domino	51
PowerSync 3.0	52
Net2Phone	58
InfoModeler 2.0	60
StatView, Version 4.5	60
Address Fixer	66
FloorPlan Plus 3D	66
Small Business Financial Manager	66
EchoSearch 1.0	69
DisplayMaster	69

First Looks Online

Join us online to view and read an interactive version of this story.

www.pcmag.com



PHOTOGRAPHS BY THOM O'DONNOR

First Looks

now. As memory prices dip below the \$10-per-megabyte level, there's never been a better time to stock your new PC with memory.

THAT'S ENTERTAINMENT

Traditional computing features and specifications are just the beginning with these four PCs. The profusion of entertainment features in these systems shows

not look like a traditional PC; from its dark-gray exterior to its rounded edges and silver accents, it looks more like a series of stereo components. Under the surface, you'll find Infinia's InTouch Module, which lets you play television, radio, and an audio CD at the touch of a button without ever looking at—or even turning on—the computer's monitor. And the Infinia is

and videotape input, we think it's the first PC to come close to the visual quality of a stand-alone television.

To see how well the systems handled demanding video, we also played the included video applications and games. All four systems came with 3-D graphics boards, software MPEG playback programs, and sample videos.

A PC's audio is just as important to multimedia capabilities, and this is an area where the systems differ a great deal. Monitor-mounted speakers often don't produce very good sound except at low volume. And at high volume, the magnets that drive the speakers tend to interfere with the monitor's display and vice versa. The result can be bad sound and an equally bad picture.

But the Aptiva consistently played clear and powerful audio, regardless of volume level.

Since these systems are intended for home markets and may very well be set up, installed, and used by computer novices, we paid particular attention to each one's out-of-box experience (OOBE). We looked at how each system's packaging, installation aids, and documentation helped or hindered getting these systems up and running.

With their target audience in mind, these four vendors equip

their PCs with color-coded cables and ports, as well as graphical setup instructions printed on the boxes and profusely illustrated manuals. Based solely on getting them up and running, deciding which of these PCs to buy is a toss-up. You won't need more than half an hour to set up any of these PCs, although the Aptiva's complex wiring could be frustrating.

Included software can be a bargain or a waste of time—depending on personal taste. We found that Sony included the best mix of titles with its PCV-90 system, but each package contained at least two useful programs.

ORIGIN OF THE SPECIES

The field of home computers is exciting, quickly changing, and still being defined. The Gateway Destination D5-166 (First Looks, June 11, 1996) was the first of the species. Because of its big-screen monitor, TV tuner, and excellent TV Guide-like software, the Destination is still the most visible computing and entertainment system for the home. As its engineers are busy readying the second generation Destination, they had better look over the home PCs we reviewed or risk falling behind.

Of the four systems we tested and evaluated, each has a specialty that recommends it to a particular audience. For those who want a slick 3-D interface that hides the complexity of Microsoft Windows 95, there's the Sony PCV-90. If you want the PC to leave as much open desktop space as possible, look at the Aptiva instead. For those seeking the gaming system par excellence, look no further than the Pavilion.

If you want it all—including the ability to watch TV or a video while using the PC—the Infinia stands head and shoulders above these other home PCs.

Hewlett-Packard Co.

HP Pavilion 7295V

From start to finish, the HP Pavilion 7295V is a gamer's dream machine. Whether shooting down aliens or pushing a race

SPEAKERS TO GO:
The system's Altec Lansing speakers fit flush against the side of the monitor or stand on their own.

CREASED CASE FRONT:
The case of the HP Pavilion and its monitor have lightly sculpted designs and creases that hold indicator lights.

TWO-WAY VIDEO: The HP Pavilion has an S3 ViRGE chip on the motherboard, but it uses a pass-through cable to connect to its special dual-port video card with 6MB of EDO DRAM for hot 3-D gaming.

that the melding of computing and entertainment is underway. In this respect, the Toshiba Infinia stands out from the crowd: It's in the vanguard of turning the home computer into an entertainment appliance.

For starters, the Infinia does

the only system of the four that lets you watch television. After extensive testing with cable TV



HP Pavilion 7295V
Pentium/200 CPU
256K external cache
32MB RAM
3.8GB hard disk
8X CD-ROM
17-inch monitor
\$3,948 list price

Hewlett-Packard Co., Cupertino, CA
800-724-6631; fax, 800-357-1317
www.hp.com/info/pchom1
Circle 431 on reader service card.

Home PCs

Yellow type denotes Editors' Choice.	HP Pavilion 7295V	IBM Aptiva S74	Sony PCV-90	Toshiba Infinia 7200
CPU and installed RAM	P/200, 32MB EDO	P/200, 16MB EDO	P/200, 32MB EDO	P/200, 32MB
External cache	256K	256K	256K	256K
Hard disk capacity and model	3.8GB Quantum Fireball	2.5GB Western Digital Caviar 32500	2.5GB Western Digital Caviar 32500	3GB Western Digital Caviar 33100
Graphics adapter and installed memory	Diamond Dual 64-bit Voodoo, 6MB EDO DRAM	ATI 3D Rage, 2MB VRAM	ATI 3D Rage, 2MB VRAM	Integrated S3 ViRGE 3D, 2MB
Monitor (and diagonal screen size claimed/measured, in inches)	HP Pavilion Multimedia (17, 15.5)	IBM MM50 (15, 13.8)	Sony CPD-100VS (15, 13.8)	Toshiba Infinia (17, 15.8)
CD-ROM speed and manufacturer	8X Goldstar	8X Mitsumi	8X Sony	8X Toshiba
Audio adapter	Yamaha OPL3-SA with Spatializer 3D	IBM MWave DSP	Yamaha OPL3-SA with SRS 3D	Yamaha OPL3-SA with SRS 3D
Modem	33.6 Kbps	28.8 Kbps DSVD	28.8 Kbps DSVD	28.8 Kbps
Standard warranty (parts and labor)	1 year	1 year*	1 year	1 year
First year on-site service included	Yes	Yes	Yes	Yes

* The motherboard has a two-year warranty.

First Looks

Editors' Choice

• Toshiba Infinia 7200

To excel, a home PC must be more than a mere computer. It must be part-teacher, part-entertainer,



and above all a member of the family. That's a tall order. Of the four home PCs we tested, the Toshiba Infinia 7200 comes closest to this ideal. It's our Editors' Choice in this rapidly evolving category.

Of the four systems, the Infinia most successfully mixes equal parts of entertainment, education, and good old-fashioned computing. From its built-in television and radio tuners to its instant, audio-CD access to its embedded speakers, the Infinia is a one-stop household entertainment and productivity center. Ironically, with all the extras that the Infinia provides 32MB of RAM, a 3GB hard disk, and a 17-inch monitor, its \$3,500 price tag is among the lowest for these four units. The Infinia is an excellent value.

The Infinia's design makes it look more like a home electronics system than a plain, putty-gray PC, and its monitor-mounted module control panel, remote control, and integrated subwoofer all add to the system's appeal and value. Our only qualm concerned the Infinia's performance, al-



though it was only slightly off the pace of the other three tested systems.

IBM's Aptiva 74S deserves an honorable mention on two counts. The separation of its func-

tional parts is a clever way to preserve desk space—a precious commodity in most homes. By keeping the floppy and CD-ROM drives in a separate media module tucked beneath the monitor and stowing the rest of the system components, which are seldom touched anyway, in a tower case on the floor, the Aptiva keeps within easy reach only what you need. And the wireless mouse works very well, particularly for those who strive to be computing couch potatoes. The Aptiva was definitely the best party machine—with strong audio capability, including a display so well shielded that the monitor didn't flicker with the volume pushed to its maximum level.

We could find nothing to object to in the HP Pavilion and Sony PCV-90, but rather than clean-sheet designs, the systems are more conservative and derivative of business computers. By contrast, the Toshiba Infinia 7200 is a bold stroke in terms of both design and functionality, and it is sure to be looked back on as a pace setter in home PCs.

car to its limits, the Pavilion's advanced, dual 64-bit 3-D graphics engine produced exceptionally sharp graphics.

The \$3,948 Pavilion carried the highest price tag in this test group, but it's worth it based on the system's graphics, included 32MB of memory, 17-inch monitor, and the 3.8GB hard disk drive. From the outside, the Pavilion appears bland sitting next to the other new home machines, particularly the Aptiva and Infinia. The Pavilion's putty-color system and monitor cases has seams that contain indicator lights, but other than that, there's no way you could confuse it for anything but a PC.

If you look closely, you'll notice that there's a pass-through video cable on the back of the system case. This intricate wiring allows the system's S3 ViRGE graphics

chip—integrated on the motherboard—to connect with the auxiliary 3Dfx Interactive Voodoo Graphics board with dual 64-bit data paths and 6MB of EDO memory. The Voodoo board is the key to the Pavilion's fast gaming as we saw when we played an included beta version of Whiplash. An absorbing and thrilling car-racing game, Whiplash showed off

the Pavilion's 3-D graphics capability and its fast processing well; at times, we had trouble keeping up with the game.

The Pavilion's Altec Lansing speakers are designed to hang on the monitor's sides but can also sit next to it. The sound system is backed by the Yamaha OPL3-SA chip set, which includes Spatializer 3D augmentation. This combination

Aptiva S74

Pentium/200 CPU
256K external cache
16MB RAM
2.5GB hard disk
8X CD-ROM
15-inch monitor
\$3,648 list price

IBM Consumer Division, Research Triangle
Park, NC, 800-426-7235
ext. 4340; fax, 800-426-4329
www.pc.ibm.com/aptiva
Circle 432 on reader service card.

SOUND SYSTEM: The Aptiva's dual-purpose mWave audio processor is a modem and sound circuit.

OUT OF THE WAY: The IBM Aptiva's mini-tower is designed to sit on the floor, out of the way.

produced great sound for gaming at low-to-moderate levels; when we turned up the volume, however, the sound started to break up and there was marked interference on the display. Of the four PCs we looked at, the Pavilion was the least effective family music machine.

On the other hand, the Pavilion was the only tested system that came with a 33.6-Kbps modem; the other three had a data throughput ceiling of 28.8 Kbps but should come with updated modem firmware to boost speed sometime soon. The usual variety of online service applications came preloaded on the Pavilion, and there are programs for voice mail as well as speaker-phone software.

A unique feature is the inclusion of Intel's ProShare video-conferencing software, which lets the user receive—but not send—video phone calls. You need a digital video camera to use the software, however. The software bundle also contains Adobe PhotoDeluxe and Harmon Interactive's Interactive TV Guide, a subscriber service that downloads weekly television schedules and lets you search for and select shows to watch or tape. Unlike with the Gateway Destination, which also uses Harmon software, you can't just click on a channel and watch the show. The Pavilion

STAND AND DELIVER: The IBM Aptiva's MM50 monitor includes room for the computer's media console, which holds the floppy and CD-ROM drives and the system's power switch.



Travel Pro™ 1900,
133 MHz Intel Pentium® Processor,
12.1" SVGA Active Matrix Display,
16MB RAM, 1.3 Gigabyte H.D.,
Six Speed CD-ROM

\$3595

MSRP Actual dealer price may vary



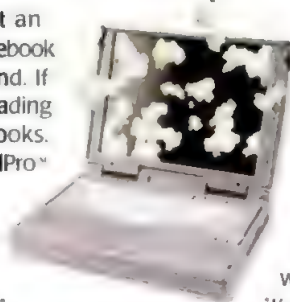
TravelPro™ 1900

Think of it as IMAX™ for your lap.

Hold on to your popcorn, because at an eye-popping 12.1", the AMS TravelPro™ 1900 notebook has one of the largest SVGA displays around. If you think that's impressive, you'll love the leading edge features that tower over other notebooks.

With its modular configuration, the TravelPro™ 1900 gives you exactly what you need without having to pay for what you don't. And that's something that is sure to please even the toughest critics.

With up to a 166 MHz Intel Pentium® processor, the TravelPro™ 1900 incorporates the fastest Intel Pentium® processor available. An Intel 430MX chip set and expandable EDO RAM (35% more powerful than DRAM) give you



overall increased performance.

For a dazzling graphic display under Windows 95, a Neomagic video chip set provides acceleration that's bound to get rave reviews. And thanks to a lightweight, longer life Lithium Ion battery, you can put away your hernia belt and give the battery charger some time off. What really will surprise you, is that while the TravelPro™ 1900 is big on features, it's small on price.

So, if you want a notebook that truly gives you the big picture, go see the new TravelPro™ 1900. Now playing at a lap near you. For more information, call 800-868-8108.

- PCI Plug-n-Play System Supports up to a 166 MHz Intel Pentium® Processor
- Internal Six Speed CD-ROM
- 3 Year Parts and Labor Warranty
- Lithium Ion Battery for Increased Battery Life
- Intel 430MX Chip Set for Enhanced System Performance
- Neomagic Video Chip Set for Vibrant Graphics & Smooth Motion Video
- Available in either 12.1" SVGA Active Matrix Display or 11.3" SVGA Active Matrix or Dual Scan Display
- SVGA Maximum Resolution 800x600
- Supports EDO RAM Expansion to 64MB and Over 2 Gigs of Hard Disk Storage
- PC Card Type III Slot, With Full Card Bus Support, SIR Infrared Wireless Interface, Audio In/Out & Docking Station Support



800-866-3536
818-813-2391



AMS Tech
Power To Go.
800-868-8108

Contact us via Compuserve: GO AMSONLINE
See us on the web: <http://www.amsnote.com>
TEL (818) 814-8851 • FAX (818) 814-0782



Parts & Labor
Warranty



818-813-2383
818-813-2384

Intel, the Intel Inside logo and Pentium are registered trademarks of Intel Corporation. All other trademarks and registered trademarks are the property of their respective companies. Not responsible for errors in advertising. Prices and specifications are subject to change without notice.

First Looks

doesn't include a television tuner, but an add-in tuner from any number of vendors should do just fine.

The Pavilion's Personal Page puts a prettier face on Windows 95, includes tutorials and set-up guides, and helps organize and access applications. We expect that those familiar with Windows 95 will disable Personal

completes work on the needed drivers. With the Aptiva Communication Center software, the system can be used as a telephone with address book, speakerphone, answering machine with voice mail, and fax machine. You're likely to be disappointed by the audio quality of your phone calls, though, because the

Along with the media console design, the system's black-on-black color scheme gives it an otherworldly look.

The Aptiva's benchmark test scores were similar to the other four home systems when tested with 16MB of RAM. It had the highest Winstone 96 score, by a slight margin. We recommend

chips with SRS 3D augmentation. Sound is played through the system's speakers, which are mounted on the monitor's sides, and a subwoofer cleverly integrated in the tilt/swivel stand. Audio quality was generally good, but when we turned the volume all the way up while playing an audio CD, there was some visible screen distortion (though not as severe as with the Pavilion) and a little sound distortion.

The PCV-90's components come in multiple shades of gray and purple, unadorned with extra peripherals. Sony, however, plans a line of add-on devices, ranging from TV tuners to wireless remote-control units.

When you fire up the PCV-90 the VAIO Space Windows 95 wallpaper greets you. You can choose between VAIO Space or the standard Windows 95 desktop as the default control screen, and it's easy to use them together. In contrast to the much slower HP Personal Page, VAIO Space never lagged.

VAIO Space places you in a 3-D desktop with a video viewer wall in front and multimedia and application walls on the left and right. Click on either side wall and it swoops to the center, so you can work your way quickly through menus. Clicking near the top of the screen, brings down a submenu of the bundled telecommunications programs, which include a speakerphone, answering machine with multiple mailboxes, and fax in addition to online service and Internet access programs.

When playing the PCV-90's bundled video CDs, the quality was terrific on a small window, but it started to break up and show artifacts when blown up to full screen. In addition to a plethora of Microsoft productivity, reference, and entertainment titles, the PCV-90 also includes WipeOut—a futuristic racetrack—and MechWarrior II.

The PCV-90's benchmark test results were on a par with the other systems'. This is good news because it means the PCV-90 holds its own in this group of fast 200-MHz Pentium systems.

SIDE-BY-SIDE SPEAKERS: The Sony PVC-90 includes two speakers mounted on the side of the monitor and a subwoofer in its base.

Page, however, because it slows this machine.

During benchmark testing with 16MB of RAM, the Pavilion led the group on the Winstone 32 test. And it was neck-and-neck with the Aptiva in Winstone 96 testing. Most of the Pavilion's other scores were average, except for its higher-than-average scores on both CPUmark processor tests. Boosting main memory to 32MB helped the Pavilion by 20 percent and 13 percent, respectively, on our Winstone 32 and Winstone 96 application tests.

A conventional PC with a sculpted case front, simplistic user interface, and souped-up graphics, the HP Pavilion 7295V is a competent PC that will appeal to the gamer in your home.

IBM Consumer Division

Aptiva S74

The \$3,648 IBM Aptiva S74's mini-tower does a disappearing act: Its floppy and CD-ROM drives and power switch hide away in the system's media console under the 15-inch monitor. The idea is to bring the home computer closer to the family by concealing the bulky system case. The system's Achilles' heel is its complicated cabling, including a thick cable that runs from the media console to the back of the tower unit.

Audio and telecommunications are both handled by IBM's dual-purpose mWave digital signal processor. The 28.8-Kbps DSVD capability will be upgradable to 33.6 Kbps when IBM



CLOSED FRONT: To protect the front of the case, the Sony PVC-90 mini-tower case has a sliding panel that covers the front of both the floppy and CD-ROM drives.

WRIST REST, NOT: You can configure the keyboard to your liking; a removable wrist rest is easy to install and remove.

Sony PCV-90

Pentium/200 CPU
256K external cache
32MB RAM
2.5GB hard disk
8X CD-ROM
15-inch monitor
\$3,478 list price

Sony Electronics Information Technologies of
America, San Jose, CA
888-476-6972, fax, 408-955-5171
www.sony.com/technology
Circle 433 on reader service card

Aptiva microphone picks up extraneous sounds.

By contrast, mWave really shines in audio applications. With stereo and its own 3-D surround-sound effects, it produces loud, distortion-free audio. When we turned the volume up all the way on an audio CD, the music and voices stayed clear with barely a hint of rumble, and the monitor image didn't flicker a bit—even when we placed the subwoofer next to it.

A wide variety of software comes with the Aptiva, including Battle Beast, Lotus Smart Suite 96, MechWarrior 2, Microsoft Encarta 96, Rand McNally's Trip-Maker 1996, VR Soccer 96, and Wall Street Money. Basic black is the fashion theme for the Aptiva.

spending an extra \$350 to upgrade to 32MB of memory, which also increases the system's hard disk size to 3.2GB and gets you the optional joystick and cordless mouse.

For rocking sound and a sophisticated look, choose the IBM Aptiva S74.

Sony Electronics Information
Technologies of America

Sony PVC-90

Sony makes a triumphant return to the American PC market with its beautifully crafted PVC-90 system. The \$3,478 package is a fast home PC with impressive screen quality and tight, clear sound at all but the highest volumes. But other than an appealing and easy-to-use graphical user interface and admirably low price, the PVC-90 does little to distinguish itself from the rest.

To no one's surprise, the focus of the system is Sony's CPD-100VS monitor, which uses a Trinitron tube that has a viewable space of 13.8 inches. This monitor is one of the best we've seen, but its size makes it feel a bit cramped; Sony doesn't yet make a 17-inch screen for its home PC line.

The motherboard has integrated Yamaha OPL3-SA audio

BENCHMARK TESTS

Home PCs



Though the four systems we tested are geared toward home use, they sacrifice just a little in terms of computing performance.

The HP Pavilion 7295V didn't break any new ground in terms of system design, but it was the performance leader on our ZD Winstone and CPUmark tests. The IBM Aptiva S74 was close behind, tying the Pavilion on the ZD Winstone 96 tests and posting the best ZD Graphics

WinMark 96 score. Although the Toshiba Infinia 7200 lagged slightly on most benchmark tests, it garnered the best ZD Disk WinMark and ZD CD-ROM WinMark scores, and it earned our Editors' Choice award for its innovative design.

To measure performance under Windows 95, we used ZD Winstone 96, Version 1.0; ZD Winstone 32, Version 1.0; and ZD WinBench 96, Version 1.0. We tested each system with 16MB of RAM.

Higher scores represent better performance.
Bold type denotes first place.

	ZD Winstone 96	ZD Winstone 32	ZD Graphics WinMark 96	ZD Disk WinMark 96	ZD CPUmark 96	ZD CPUmark 32	ZD CD-ROM Winmark 96
HP Pavilion 7295V	68	88	29.1	1,010	402	378	818
IBM Aptiva S74	68	80	31.7	1,060	355	355	770
Sony PCV-90	64	81	31.2	1,080	354	344	728
Toshiba Infinia 7200	62	76	25.5	1,110	356	341	828
Average Pentium/200 (First Looks, 7/96)	81	101	36.0	1,142	361	371	736

Boosting RAM to 32MB raised performance by 24 percent and 18 percent, respectively, on our Winstone 32 and Winstone 96 application tests.

The Sony PCV-90 doesn't break new ground technologically, but by combining fast computer components with Sony video and audio, a 3-D user interface, and an exceptional software mix, the PCV-90 is an appealing home system.

Toshiba America Information Systems

Infinia 7200



In PCs, as in baseball, it's a rare event to hit a home run on your first at-bat, but that's what Toshiba's Infinia 7200 has done. Put

simply, of the tested systems Toshiba—a force in the notebook world—prepared the Infinia best to take its place in your den and become a member of the family.

The Infinia's components are dark gray, with shiny silver feet on the mini-tower case. Priced at \$3,548, the Infinia is not the cheapest system we looked at, but it is the only one that has integrated television and radio tuners

and 32MB of RAM. The Infinia's instant-access controls for the television, radio, CD player, telephone answering machine, and speakerphone make using these features as easy as can be.

As with the other systems, the Infinia's 17-inch monitor has integrated speakers on the sides with a subwoofer below. The monitor is connected to the system unit via a conventional video cable and a universal serial bus power connector. A conventional wired keyboard and mouse are supplemented by an infrared remote control that can be used as a computer

pointing device and as a control for the system's entertainment and communication functions.

Although the Infinia monitor doesn't swivel, a winglike, silver mechanism tilts the screen. The InTouch control module hangs in front of the monitor and has a big volume button, sleep button, infrared remote-control receiver, LCD screen, ten buttons to select and control functions, and—happily—a mute switch. With the television function activated, the control buttons are used to change channels and mute the sound. Master volume and subwoofer volume controls are just behind the left speaker, out of sight but accessible.

The Infinia's television and FM radio tuner worked exceptionally well. When you first switch on the

AUDIO-VIDEO: The InTouch modules adds a status screen and controls. The Infinia is the only PC we reviewed that includes a TV tuner (see insert).



TILT-O-MATIC: The Infinia's monitor has a sturdy winglike mechanism on the lower back to adjust tilt angle.

IN TOUCH: The Infinia's infrared InTouch Remote lets you control your TV, radio, CD, and speakerphone.

television, the viewing window is small, but it can be resized to a full screen. The system displays an image similar in quality to that of a standalone TV set. Moving the cursor to the bottom of the screen brings up a software television control panel with typical television adjustments, including channel selection, ten channel presets, and on-screen volume control.

The Infinia's audio quality was very good; there was just a little distortion at full volume with the subwoofer at its maximum setting and barely discernible video flicker on the edge of the screen. At normal listening levels the audio is pleasant and noticeably better than most televisions.

On our benchmark tests, the Infinia was marginally below-average on the Winstone 96, Winstone 32, and Graphics WinMark tests. The system did, however, have the best Disk WinMark score of the four systems. With 32MB of memory in place, the Infinia improved its scores more than any of the other home PCs tested: 28 percent and 17 percent on Winstone 32 and Winstone 96 scores, respectively.

Notable titles included with the Infinia are MechWarrior 2, Rand McNally's TripMaker, Sony Music Entertainment's video music player—Screeners—TerraTopia, and Shanghai Great Moments.

If you're in the market for the best at bringing together computing, entertainment, and communications, the Toshiba Infinia 7200 is for you. And it can be yours for a surprisingly low price.

Infinia 7200

Pentium/200 CPU
256K external cache
32MB RAM
3GB hard disk
8X CD-ROM
17-inch monitor
\$3,548 list price

Toshiba America Information Systems,
Computer Systems Division
Irvine, CA; 800-334-3455, 714-563-2000
www.computers.toshiba.com
Circle 434 on reader service card.

**Windows 3.1
and WINDOWS 95**

CIRCLE 057 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMA3.COM](http://www.pcma3.com)

Introducing GroupWise™ 5 from Novell®.

It's e-mail expanded to its full potential,

with complete messaging, workflow and

document management via the Universal

Mailbox. GroupWise runs on virtually any

platform, making migration from your

current e-mail simple. Because it works

like e-mail, your users will pick it up right

away. It's Internet and intranet ready, too.

Once you have GroupWise, your old

mail will look, well, old. For the nearest

Novell Platinum or Gold Partner, just call

us at the phone number listed below.

*Free GroupWise Interactive
Demo. Call 1-800-778-1851*

www.novell.com/groupwise/

Novell®
Everything's Connected™

GroupWise

SEND AND RECEIVE MESSAGES.



THERE'S

e

MAIL.

© 1996 Novell, Inc. All rights reserved. GroupWise, Novell, Everything's Connected, Novell Platinum Partner and Novell Gold Partner are trademarks or registered trademarks of Novell, Inc.

AND NOW THERE'S MAIL.



{ SEND AND RECEIVE MESSAGES, FAXES, VOICE
MAIL, PAGER MESSAGES, INTERNET, INTRANET,
CALENDAR, REMOTE ACCESS, CONFERENCE
CALLS, WORKFLOW MANAGEMENT, DOCUMENT
MANAGEMENT AND UNIVERSAL MAILBOX. }

WORLD WIDE WEB

Refine Your Search

Advanced search engines help you find just what you're looking for.—By John Morris

In the July 1996 edition of First Looks, we reviewed six popular search engines and indexes on the World Wide Web ("Finding Your Needle in the Web's Haystack"). Although sites like AltaVista and Yahoo! continue to draw the lion's share of curious site seekers, a newcomer and an Internet stalwart are muscling their way into the competition with innovative ways to comb through the Web's clutter.

Excite (www.excite.com), which got its start as a search service for Usenet newsgroups, has an intelligent search technology backed by a greatly expanded full-text index. A more recent entrant, HotBot (www.hotbot.com), takes a similar tack by offering an enormous full-text index, but also makes it easier to craft carefully defined search strings to find just what you're looking for.

EXCITE

Excite wants to be more than a Web search engine. The site contains such a broad array of information and services that many users may want to make www.excite.com their default home page. In addition to a search engine based on Excite's Intelligent Concept Extraction (ICE) technology, the home page offers Yahoo!-like site reviews, news, directories and other references, and City.Net, a localized information service that covers many major U.S. and foreign cities.

Excite's home page is well organized. At the top is a toolbar that provides access to all major services. Directly below it is the search box. To begin a search, simply enter a word or phrase

and hit the Search button. A pull-down menu allows you to choose whether to search the Web, Web reviews, newsgroups, or Usenet classifieds. Excite's ICE technology locates and gives documents in

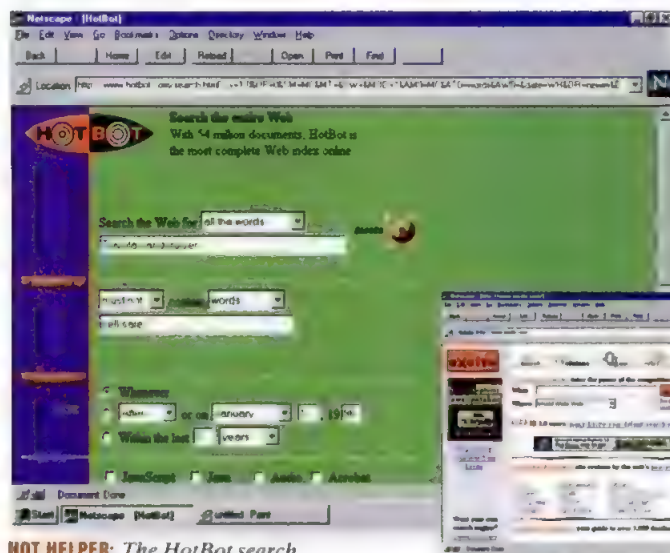
by site, which allows you to determine quickly which sites will be most useful to you. Below the search box is a directory of Excite's Web reviews sorted by subject. Each section has a brief column by its editor, with links to some of Excite's preferred sites in that category, a handful of reviews, and subheads. A subheading on the TWA Flight 800 crash, for instance, had links to six pertinent sites.

Finally, Excite's City.Net pro-

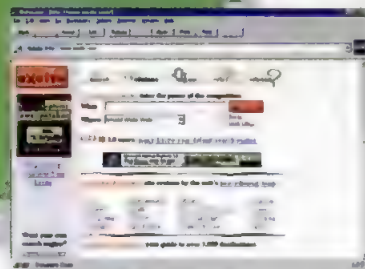
A pull-down menu allows you to choose whether you want to search on all the words you've entered, any of the words, an entire phrase, or a person's name. You can also search for all documents with links to a specific URL.

If you have HotBot search for information about a person, the program casts a wide net. We entered "Bill Clinton," for example, and HotBot also returned documents containing "Clinton, Bill" or "Bill J. Clinton."

Like Digital's AltaVista (www.altavista.digital.com), HotBot indexes so many pages that in most cases you'll need to provide more specific information to keep the number of hits to a manageable size. We used the Modify menu to include or exclude pages that contain certain words or phrases. You can also specify cer-



HOT HELPER: The HotBot search engine combines a massive index of Web pages with innovative search functions.



I'M SO EXCITED: In addition to site reviews and a flexible search engine, Excite includes a guide to the goings-on in major cities.



Join Us Online

From October 7 to 11, go online to discuss advanced World Wide Web search engines, such as Excite and HotBot, with PC Magazine staff editor John Morris. To join the discussion, point your browser to

WWW.PCMAG.COM/DISCUSS.HTM.

Excite's full-text index a rating, or confidence level, based on the relevance of concepts and keywords.

Like AltaVista, Excite claims to have profiled about 50 million pages. ICE tries to minimize data overload, but Excite often returned a mind-boggling multitude of hits. The bad news is that a search on "Bob Dole" and "taxes" yielded 1,457,596 documents. The good news is that Excite did an excellent job of rating these pages based on relevance. The first ten hits all matched our search exactly and pointed us toward a variety of useful sites.

In addition to viewing search results by confidence level, you can sort

views local information on and links for 54 foreign and domestic cities as of press time. You can select a restaurant, check out its menu, and print out a map that shows you how to get there. City.Net even carries Intellicast weather reports for these locales.

Excite combines a sophisticated search engine with a wealth of useful news sources and information.

HOTBOT

HotBot is a joint venture of HotWired (www.hotwired.com) and Inktomi (www.inktomi.com), which builds high-end workstations. HotBot claims to have located more than 50 million documents on the Web, with 36 million of them indexed and ready for searching.

But the true strength of HotBot is that it can perform as simple or as complex a search as you want.

tain words that the pages should contain. The Expert menu lets you refine searches based on date, media type (such as Java, Shockwave, or VRML), specific domain or server, geographic location, and number of hits.

For example, we searched on the word "LandCruiser"—a sport utility vehicle made by Toyota—and HotBot returned 797 hits, many of them classified ads. By excluding pages with the words "sale" and "sell," we narrowed the results down to 595 hits; we then restricted our search to pages on Web servers located in Africa—where the truck is popular—and got back just one match: an account of travels in Malawi.

HotBot's advanced search capabilities make it well suited for serious researchers, hobbyists, or anyone looking for specific, detailed information within a broad category. Anything that reduces the complexity of the Web is a welcome advance for harried cyberspace travelers.

After the
Revolution
there was
Gateway!



"You've got a friend in the business."

With *Service* and *Value* for *All!*



When in the course of human events it becomes necessary for people to rely upon technology to further their endeavors, they deserve the highest quality, value and service. We the people of Gateway 2000 therefore renew our pledge to live by a Customer Declaration of Independence, thus placing the human condition at the heart of our PC revolution.

Human need drives Gateway's innovations. Our Gateway Solo 2100 portable gives you the freedom to break free, challenge the limits of human achievement — and overcome them. Our G6 desktops serve people with breathtaking 32-bit speed thanks to the Pentium Pro processor.





And Gateway's Destination Big Screen PC rises to the needs of the people by merging the PC and television and yet remains greater than the sum of those parts. Its powerful computer heart, huge 31-inch-diagonal screen and television capabilities make it literally a computer for the masses.

These products, and our pledge to support them with customer-centered service, lie at the heart of Gateway's PC revolution.

Sustained by the people it serves, the revolution marches on.

C U S T

Declaration of

When in the course of human affairs, computer products to enhance the lives of the purveyors of such products to meet ce

Therefore,

KNOWLEDGE being key to manufacturers shall employ sales representatives to freely offered information.

PC COMPANIES shall not re technology at outstanding prices.

BEING THE BEST JUDGE shall have the right to purchase a **PC** available options.

CUSTOMERS shall have the r properly upon delivery.

THE RIGHT to knowledgeable in a timely fashion and sensitive to cus

ACKNOWLEDGING that P of customers, the customers' needs sha within the evolution of the personal co

We the most senior officers of Gate certain management principles that promote customers and, through the working of th



John Allen Taylor
Bob Back
Rm Qua



GATEWAY
"You've got a free

800-846

Multimedia Systems

P5-120 FAMILY PC

- Intel® 120MHz Pentium® Processor
- 16MB EDO DRAM
- CrystalScan™ 15.28dp Monitor (13.9" viewable)
- 1MB DRAM, 64-Bit PCI Graphics
- 1GB 10ms EIDE Hard Drive
- 8X CD-ROM/3.5" Diskette Drives
- 16-Bit GATEWAY™ Sound Card
- Altec™ Lansing ACS-40 Speakers
- TelePath® 28.8 Fax/Modem for Windows with Speakerphone
- Mini Tower Case
- 104* Keyboard & MS Mouse 2.0
- Microsoft® Windows® 95
- Generations II Software Collection

\$1699

P5-166 FAMILY PC

- Intel 166MHz Pentium Processor
- 16MB EDO DRAM
- 256K Pipelined Burst Cache
- Vivitron™ 17.26dp Monitor (15.9" viewable)
- 2MB DRAM, 64-Bit PCI Graphics
- 2GB 11ms EIDE Hard Drive
- 8X CD-ROM/3.5" Diskette Drives
- 16-Bit Gateway Sound Card
- Altec Lansing ACS-40 Speakers
- TelePath 28.8 Fax/Modem for Windows with Speakerphone
- Mini Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- Generations II Software Collection

\$2399

G6-180

- Intel 180MHz Pentium Pro Processor
- 32MB EDO DRAM
- 256K Internal Cache
- Vivitron 17.26dp Monitor (15.9" viewable)
- 2MB DRAM, 64-Bit PCI Graphics
- 3GB 11ms EIDE Hard Drive
- 8X CD-ROM/3.5" Diskette Drives
- 16-Bit Ensoniq® Wavetable Sound Card
- Altec ACS-40 & ACS-250 Speakers
- TelePath 28.8 Fax/Modem for Windows with Speakerphone
- Mini Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- Generations II Software Collection

\$2899

G6-200XL

- Intel 200MHz Pentium Pro Processor
- 32MB EDO DRAM
- 256K Internal Cache
- Vivitron 17.26dp Monitor (15.9" viewable)
- Matrox® 2MB WRAM PCI Graphics
- 3GB 11ms EIDE Hard Drive
- 8X CD-ROM/3.5" Diskette Drives
- CD-Recordable w/ SCSI Controller
- 16-Bit Ensoniq Wavetable Sound Card
- Altec ACS-400 & ACS-250 Speakers
- TelePath 28.8 Fax/Modem with Speakerphone
- Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition
- Generations II Software Collection

\$3799 Business Lease* \$140/mo.

Professional Systems

P5-133

- Intel 133MHz Pentium Processor
- 16MB Synchronous DRAM
- 256K Pipelined Burst Cache
- Vivitron 15.26dp Monitor (13.9" viewable)
- 1MB DRAM, 64-Bit PCI Graphics
- 1GB 10ms EIDE Hard Drive
- 8X CD-ROM/3.5" Diskette Drives
- Mini Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition

\$1699 Business Lease* \$63/mo.

P5-166

- Intel 166MHz Pentium Processor
- 16MB Synchronous DRAM
- 256K Pipelined Burst Cache
- Vivitron 17.26dp Monitor (15.9" viewable)
- 2MB MDRAM, 128-Bit PCI Graphics
- 2GB 11ms EIDE Hard Drive
- 8X CD-ROM/3.5" Diskette Drives
- Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition

\$2249 Business Lease* \$83/mo.

P5-200

- Intel 200MHz Pentium Processor
- 32MB Synchronous DRAM
- 256K Pipelined Burst Cache
- Vivitron 17.26dp Monitor (15.9" viewable)
- 2MB MDRAM, 128-Bit PCI Graphics
- 3GB 11ms EIDE Hard Drive
- 8X CD-ROM/3.5" Diskette Drives
- Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition

\$2649 Business Lease* \$97/mo.

G6-180

- Intel 180MHz Pentium Pro Processor
- 32MB EDO DRAM
- 256K Internal Cache
- Vivitron 17.26dp Monitor (15.9" viewable)
- 2MB MDRAM, 128-Bit Graphics
- 3GB 11ms EIDE Hard Drive
- 8X CD-ROM/3.5" Diskette Drives
- Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition

\$2649 Business Lease* \$97/mo.

Gateway Solo™ 2100 Portable PCs

S5-120

- 11.3" DSTN SVGA Color Display
- Intel 120MHz Pentium Processor
- 16MB EDO DRAM expandable to 40MB
- 256K Pipelined Burst Cache
- 1MB EDO Video RAM
- Zoomed Video Port
- 540MB Hard Drive
- Modular 6X CD-ROM Drive
- Modular 3.5" Diskette Drive
- 16-Bit Sound & Stereo Speakers
- Lithium Ion Battery & AC Pack
- 85-Key MS Windows 95 Keyboard
- Carrying Case
- MS Windows 95
- MS Works 95

\$2699 Business Lease* \$99/mo.

S5-133

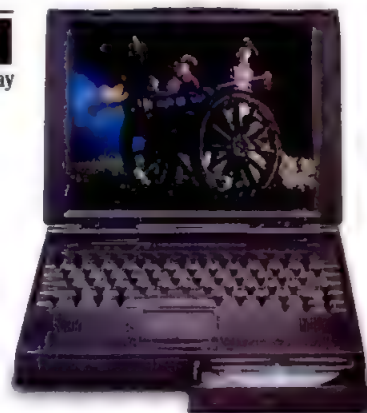
- 12.1" Active Matrix SVGA Color Display
- Intel 133MHz Pentium Processor
- 24MB EDO DRAM expandable to 40MB
- 256K Pipelined Burst Cache
- 1MB EDO Video RAM
- Zoomed Video Port
- 810MB Hard Drive
- Modular 6X CD-ROM Drive
- Modular 3.5" Diskette Drive
- 16-Bit Sound & Stereo Speakers
- Lithium Ion Battery & AC Pack
- 85-Key MS Windows 95 Keyboard
- Carrying Case
- MS Windows 95
- MS Office 95, Professional Edition

\$3899 Business Lease* \$143/mo.

S5-133 BEST BUY

- 12.1" Active Matrix SVGA Color Display
- Intel 133MHz Pentium Processor
- 40MB EDO DRAM
- 256K Pipelined Burst Cache
- 1MB EDO Video RAM
- Zoomed Video Port
- 1.2GB Hard Drive
- Modular 6X CD-ROM Drive
- Modular 3.5" Diskette Drive
- 16-Bit Sound & Stereo Speakers
- 28.8 PCMCIA Fax/Modem
- Lithium Ion Battery & AC Pack
- 85-Key MS Windows 95 Keyboard
- Carrying Case
- MS Windows 95
- MS Office 95, Professional Edition

\$4799 Business Lease* \$176/mo.



8 0 0 - 8 4 6 - 7 0 6 2

<http://www.gw2k.com>

Toll free from Canada
800-846-3609



Toll free from Puerto Rico
800-846-3613



Revolutionary ExTraS!



- Microsoft® Encarta® 96 ■ MS Cinemania® '96 ■ MS Julia Child: Home Cooking with Master Chefs ■ MS Bob™, for Gateway 2000 ■ MS Works 95 ■ MS Publisher 95 ■ MS Money 4.0 ■ MS Golf 2.0 ■ MS Music Central™ 96 ■ MS CD Sampler ■ MS Entertainment Packs 1-4 (31 fun games!) ■ Ca\$h Graf Home Office Plus™ ■ Mayo Clinic® Family Health Book ■ Mediamatics Arcade™ MPEG Player ■ The Masters®: Interactive Journey Through Its 60-Year History, for MPEG

Powerful Upgrades

- Altec™ Lansing ACS-250 Subwoofer \$75
(upgrade from PCs that include Altec ACS-40 speakers)
- Altec ACS-400 Speaker System
w/ ACS-250 Subwoofer \$120
(upgrade from PCs that include Altec ACS-40 speakers)
- Iomega® Ditto™ 3200 Internal Tape Backup Unit \$199
3200MB with compression, nominal 1600MB
- 3Com® 16-Bit Triple Media Card \$99
- SMC® PCI 10/100 Twisted Pair Card \$129
- NEW!** ■ MS Windows NT® 4.0 Upgrade \$99
(upgrade from PCs that include MS Windows 95)
- Big Screen 31" VGA Monitor \$1699**
- Big Screen Presentation Package \$1899**
(includes Big Screen 31" VGA monitor, wireless keyboard, Field Mouse® remote and RF receiver)

**Call for monitor specifications and for desktop and portable PC configuration options.

Portable PC Options

- 28.8 PCMCIA Fax/Modem \$200
- 14.4 PCMCIA XJACK® Fax/Modem \$119
- 3Com 10BASE-T Ethernet Adapter \$129
- 3Com Coaxial Ethernet Adapter \$159
- IBM® Token Ring Adapter \$399
- Upgrade 120MHz to 133MHz Intel Pentium Processor \$150
- Upgrade 133MHz to 150MHz Intel Pentium Processor \$150

Call the GATEWAY™ component add-ons division at 800-846-2080 for our complete line of extras for Gateway customers. Sales Hours: 7am-10pm Weekdays (CDT).



Gateway 2000 Manufacturing,
North Sioux City, South Dakota,
is ISO 9002 certified.



8 0 0 - 8 4 6 - 7 0 6 2

<http://www.gw2k.com>



Ask About Our
"90 Days No Payment"
Program!

Software

- Games & Entertainment Pack
Su-FLANKER™; Al Unser Jr. Arcade Racing™; 3-D Ultra Pinball™; The Journeyman Project 2®: Buried in Time™; Greg Norman Ultimate Challenge® Golf; and Windows 95® Game Sampler. \$99
- Kid's Backpack™ III
Includes School House Rock!™; Grammar Rock™; Sesame Street: Get Set to Learn®; Math Blaster 2®: Secret of the Lost City; Imo & The King™; Putt-Putt® Goes To The Moon™; and Gateway cow-spotted backpack. \$59
- Finance Pack (U.S. Shipment Only)
Includes Quicken® Deluxe 5, Quicken Financial Planner,™ Quicken Family Lawyer,™ and Quicken Parents' Guide to Money.™ \$59
- MONOPOLY™ \$39
- Quicken Deluxe 5 \$59
- Disney's Toy Story Animated StoryBook \$35
- The Print Shop® Deluxe Ensemble™ II \$69

Printers, Scanners & Digital Cameras

- Epson® Stylus™ Color IIs Ink Jet Printer \$199
- Epson Stylus Color II Ink Jet Printer \$279
- Epson Stylus Pro Printer \$449
- Hewlett-Packard LaserJet 5L Xtra Printer \$479
- Hewlett-Packard LaserJet 5P Printer \$849
- Epson Action Scanning™ System II \$449
- Epson Photo PC \$499

Service & Support

Gateway Gold™ Premium for Desktop Systems

- Extended Three-Year On-Site Agreement*
- Priority 800 Number For Access to Technical Experts
With system purchase \$99
Within current on-site service agreement \$129

*On-site service for desktop and tower systems is available to most U.S. and Canadian locations after determination by a Gateway tech that you need it. On-site service is provided by PC Technology Services, Inc. Write or call for a free copy of the on-site service agreement.

Gateway accepts most major credit cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers. You can also apply for the Gateway 2000 DuoLine™ MasterCard® card, issued by Dial National Bank, Des Moines, Iowa.



GSA Schedule # GS-35F-3349D

© 1996 Gateway 2000, Inc. GATEWAY 2000, CrystalScan, black-and-white spot design, Field Mouse, "G" logo, TelePath and "You've got a friend in the business" slogan are registered trademarks, and Destination, EZ Pad, Family PC, GATEWAY, Gateway Gold, Gateway Solo, Gateway 2000 DuoLine and Vivitron are trademarks of Gateway 2000, Inc. The Intel Inside Logo, Intel and Pentium are registered trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping or applicable sales tax. Many Gateway 2000 products are custom engineered to Gateway 2000 specifications, which may vary from the retail versions of the software and/or hardware in functionality, performance or compatibility. *Leasing arranged by independent leasing companies to qualified commercial customers. Lease payments based on 36-month term. Lease terms subject to change without notice or obligation. **Each tested system included an Intel Pentium processor. The G6-180 uses an Intel 180MHz Pentium Pro processor and the P5-200 uses an Intel 200MHz processor. Ziff-Davis' Winstone 32 version 1.0 overall score was achieved on the G6-180 and P5-200 using 32MB DRAM, 3GB hard drive, and STB Tseng ET 6000 video adapter 2MB MDRAM with 1.22M driver refresh rate of 75Mz, Toshiba 8X IDE controller with no controller RAM cache and no CD-ROM specific software cache, vcache, and 640x480 pixels, 256 colors. Both systems were tested using MS Windows 95 Enhanced Mode with Paging, and MS Windows NT 3.51. All products used in these tests can be shipped to the consumer as a custom configuration. The Winstone 32 test was performed without independent verification by Ziff-Davis. Winstone is a registered trademark of Ziff-Davis Publishing Company, L.P.

Premier Power Platform

PREMIO® FX Pro200



Premier PREMIO® stands for dependability. Made by CompuTrend, an Inc. 500 company, all Premio motherboards and monitors are ISO-9000 certified. And YES, all Premio computers are NetWare® certified in our Novell® Labs approved test center. Premio computers carry a 3-year warranty, with optional on-site service.

Power Optimized for full 32-bit environments, the Premio FX Pro200 Pentium® Pro processor-based computer is your best choice for Windows® NT. With Burst EDO, Concurrent PCI, Bus Master IDE, and ECC, Premio delivers the power and reliability needed for your critical applications.

Platforms The Premio FX Pro is tested compatible with NetWare 4.x, Windows NT, Solaris®, and SCO® Unix, and is DMI-enabled. We cross test and integrate components from Adaptec®, 3Com®, Number Nine® and others. Custom, local assembly ensures solutions tailored to your needs are delivered quickly.

"CompuTrend Systems' Premio - offers top components." "Moreover, it integrates them well, with strong performance as the result."

PC Magazine Feb. 20, 1996

For the Premio partner nearest you, or more information on Premio Power Platforms, please contact us immediately:

Phone: 800-677-6477
Web: <http://www.premiopc.com>
E-mail: mktg@premiopc.com



GSA#: GS-35F-3066D

CMAS: 3-95-70-0145A



CIRCLE 348 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

Intel, the Intel logo, Pentium, and Windows are trademarks of Intel Corporation. All other trademarks and brand names are the property of their respective owners.

WEB SERVER SOFTWARE

Your Surfboard for Notes

Lotus's Domino serves up Notes applications and databases as Web pages.—By Tony Pompili

Lotus's new Domino Web server for Notes moves the powerful groupware system a step closer to becoming a full-fledged Web application development and publishing tool. Existing Notes databases

information is up-to-date and in sync no matter which client—Notes Release 4 or a standard Web browser—you use.

Domino acts like a standard HTTP server, converting Web browser requests into Notes serv-

especially useful for applications such as discussion databases, in which new entries need to be dynamically updated in views.

Creating a Domino application is nearly identical to creating a Notes application, and we found that many Notes applications are ready to run with little modification. Notes Forms, the basic templates for displaying and accepting user information, are created with Notes Design tools, a menu option on the full

groups to the ACL and assign levels of rights. This gives you control not only over who has permission to view an individual database, but who can read, edit, or delete documents within databases.

Not every Notes client feature works with a browser, so developing effective Notes/Web applications takes a little planning. The Notes scripting language, which performs client-specific commands such as pulling down the Compose menu, doesn't work in browsers. Since browsers don't have LotusScript interpreters, LotusScript doesn't work in Web applications either. One exception to this is server-based Notes Agents, scripts that perform ad hoc event-driven or scheduled processes directly on the server. Java and JavaScript are not yet supported. Since Notes already supports much of this functionality, however, such application development tools aren't really necessary.

We found that for existing Notes Release 4 sites, the Domino installation is pretty straightforward, although it does involve modifying the Address Book—a task that can cause a few sleepless nights for Notes administrators. The Address Book modifications add Web-related fields to Person and Server documents. Web users are added just the way other Notes users are, except that instead of using a Notes ID, Notes authenticates all Web users with a password and user name. Domino supports SSL (Secure Socket Layer).

Domino fulfills Lotus's promise to provide an HTTP server interface to its Notes Release 4 customers. With its arrival, the reasons for not migrating to the Web are quickly falling away—one after the other.

Domino. List price: Free for Notes Release 4 Server customers. Requires: Notes Release 4.0 Server and Client, Microsoft Windows NT 3.51. Lotus Development Corp., Cambridge, MA; 800-346-1305, 617-577-8500; www.domino.lotus.com. **Circle 401 on reader service card.**

Pages can include Notes check boxes and buttons for data entry.

HTTP form-like fields let users enter text directly into Notes databases.

and applications, once accessible only via Notes clients, can now be published on an intranet or the Internet and then become accessible instantly to anyone with a Web browser.

Available for free to Notes Release 4 Server customers, Domino is currently available only for Microsoft Windows NT; Domino is expected to be available for OS/2 and Unix by the end of the year.

Based on Lotus's previous InterNotes Web Publisher 2.0, Domino performs on-the-fly conversion of Notes databases to HTML, making the same Notes Views, Navigators, and documents available as standard Web pages. Because Notes and Domino share the same applications and databases,

er API calls. For example, a Web user connects to a Domino server using the standard URL. Domino pages look and work just like HTML pages; they can contain image maps, links, and any elements found in HTML 3.0. We tested Domino on a server running Windows NT 3.51 accessed by a desktop PC using Netscape Navigator Gold 2.02.

Since Domino takes care of the Notes-to-HTML formatting, an application developer doesn't have to worry about HTML or links when creating applications. For example, during testing, Domino converted views into Web pages consisting of document summaries and links. Notes maintained these links automatically. This makes Domino

WEB SAVVY: Domino can seamlessly convert Notes elements and forms into HTML for browsing.

Notes Release 4 client. Forms can contain rich text, graphics, and tables, as well as fields.

Like HTML forms, Notes Forms can be used for collecting Web user input. Documents completed by users with browsers are added directly to Notes databases. Notes field translation and validation formulas work on the Web as well, forcing browser users to enter required fields or to check the accuracy of input data.

You can also create Views—lists of documents organized in tabular form—which is useful for managing large databases of documents. When you collapse or expand Views, Domino immediately refreshes the page displayed. This makes it easy to locate, view, and work with topics and documents in such applications as discussion databases.

Domino also converts Notes Navigators—customizable GUI elements complete with hot spots to simplify navigation through Notes and Web apps—into image maps with links. Clicking on a hot spot with either a browser or a Notes client automatically brings up the linked page, which can be a View, Form, or another Navigator.

Security is based on Notes' Access Control List (ACL). You assign rights to Web users the same way you add Notes users and

FILE TRANSFER

Staying in Sync

PowerSync is an inexpensive utility for moving and synchronizing files.—By Bruce Brown

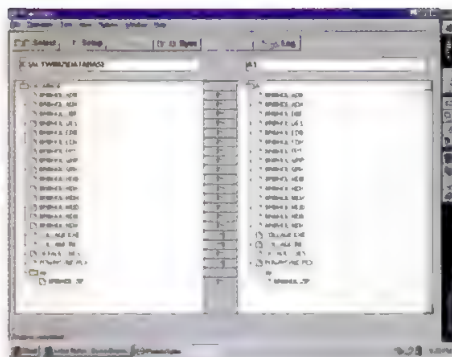
Whenever files live on more than one computer at a time, keeping them current and synchronized can be an arduous task. LinkPro Technologies' \$89.95 PowerSync 3.0 is a 32-bit Microsoft Windows 95 and Windows NT utility that can help you keep all your files in tune.

If you share files with others on a network, dial in remotely to a base computer, connect via cable, plug a notebook into a docking station, or use floppy disks to transfer files, PowerSync's simple interface and single-purpose focus make file synchronization easy. Just select two directories on PowerSync's split screen and the program determines which files

need to be updated. PowerSync isn't dynamic, so any file or directory changes that you make are not reflected until you refresh the screen.

For automatic file synchronization, PowerSync's Quick-Sync mode runs at specified times or at system start-up or shutdown. There's also an unattended mode.

PowerSync makes it easy to move files to other systems because the program doesn't have to be on both PCs. And for security, you can make synchronization one-directional to prevent



HIGHLIGHT TO UPDATE: Select directories on the source and target drives to update files with LinkPro Technologies' PowerSync for Windows 3.0.

unwanted file distribution.

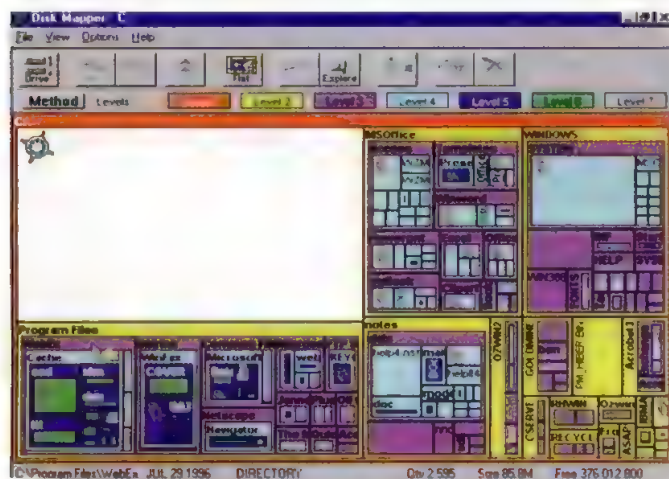
A replication feature allows you to use PowerSync as a backup utility for keeping an updated copy of a hard drive on a second drive in the system or archived on an external device. You can add, delete, or update files in the target directory to make it match the source directory. A batch function lets you launch another application while

updating; we found this ability useful for starting our network log-on program. PowerSync keeps a detailed activity log of all file movements.

PowerSync doesn't have the full remote-control features or chat mode found in Traveling Software's \$150 LapLink for Windows 95. It copies only whole files and lacks LapLink's SpeedSync feature, which transfers only the changes made to a file.

If you don't need an industrial-strength remote-control program and want to be able to automate directory and file updates, PowerSync is an easy way to make sure you have only the freshest files on all your computers.

PowerSync 3.0. List price: \$89.95. Requires: 4MB RAM, 1MB hard disk space, Microsoft Windows 95 or Windows NT. LinkPro Technologies Inc., Newport Beach, CA; 800-449-7962, 714-833-3322; www.linkpro.com/lp_hm_pg. Circle 406 on reader service card.



BLOCKS OF BLOCKS: DiskMapper graphically displays how much disk space is used by your files.

extremely intuitive because the relationship of each rectangle to the entire map is proportional to the amount of hard disk space used by that object. Unlike Explorer, File Manager, or other list-based representations of a disk's contents, DiskMapper's results are readily apparent at a glance. Because the DiskMapper rectangles are nested, a top-level directory's size is the same regardless of whether its contents reach one level down or several levels. This is useful for uncovering that 30MB database stored five levels below the root.

DiskMapper can map any physical or logical drive, including those on a network server. Performance is quite reasonable: Mapping a local 1.2GB drive with nearly 10,000 files took only about 20 seconds, although it took over 4 minutes to map a 2.2GB network volume with more than 27,000 files.

By default, the program color-codes directories and files

based on their levels in the directory tree. But you can also elect to color the boxes based on a file's or directory's age, extension, archive bit, or protection status (read-only or hidden, for example), or on whether it has been changed since its creation. There are 23 supplied color schemes, and you can make your own.

DiskMapper can also zip, unzip, launch, and delete files. A full installation of DiskMapper uses about 500K of disk space, but the program gives you the opportunity to save at least that much space by finding old or unused files. The retail version is well worth its cost. And if you order DiskMapper from Micro Logic's Website, you'll get a \$5 discount.

DiskMapper is an indispensable utility for keeping track of what's really on your hard disk drive and where it's hiding.

DiskMapper. List price: \$49.95. Requires: 4MB RAM, 350K hard disk space, Microsoft Windows 3.x or Windows 95. Micro Logic Corp., Hackensack, NJ; 201-342-6518; www.miclog.com. Circle 409 on reader service card.

UTILITIES

Visualize Your Disk Drive

DiskMapper lets you explore the nooks and crannies of your system's disk drive.—By Bruce Brown

Most new computers come with hard disks that hold at least 1GB of data. So why do we run out of disk space so soon after purchasing these new systems? Micro Logic Corp.'s \$49.95 DiskMapper is an essential tool that provides an answer in the form of a graphical map showing

what's stored where and what's hogging all that disk space.

DiskMapper works with Microsoft Windows 3.x and Windows 95 systems. It displays a disk's contents as a series of color-coded boxes. Each box represents a directory, subdirectory, or file.

The program is visual and ex-

ONE OF THE MANY REASONS MORE AND
MORE PEOPLE NEED PIVOT MONITORS.

They're describing their ordinary monitors as "vertically challenged."



Don't blame your
monitor for being
short and wide.

It's the way most
of them are built. Most, except
for the MicroScan™ 17X. With
a simple swivel, the MicroScan
17X provides more vertical
viewing area than any other
17" and even 21"
monitors. Just
imagine how much
easier that would
make working with
Windows, web pages,
or any kind of applications.
Once you see the MicroScan
17X pivot monitor in action,
you may never turn back.
To find out, call:



1-800-228-0530.



The MicroScan 17X
features a 17" CRT (16"
diagonal viewing area),
1024 x 768 resolution,
76Hz flicker-free refresh
rate and .28mm dot pitch.

ADI

CIRCLE 226 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

{ See How Business Travels }

Center Stage, Monte Carlo.

Meet the **Monte Carlo** notebook from Fujitsu. Multimedia tools for the road or office.

It's your presentation. Your chance to steal the show. Do it with impact, using sound, visuals, and motion.

The Monte Carlo™ notebook delivers all with remarkable ease, offering the full multimedia capability of a desktop.

The Monte Carlo notebook is backed by a three-year limited warranty, including 24-hour, 7-day toll-free technical assistance. And with optional extended warranties, you can get services such as next-day replacement.

All from Fujitsu, a \$36 billion leader in information technologies with operations in more than 100 countries.

Fujitsu has earned this position by focusing closely on the consumer and exceeding expectations.

See for yourself how the Monte Carlo notebook can help you take center stage.

OUTSTANDING PERFORMANCE

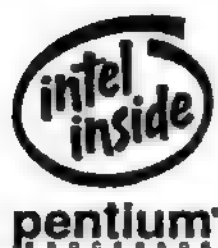
Up to 133MHz Pentium® processor, 256K level 2 cache and up to 16MB expandable EDO RAM all built on 32-bit PCI bus architecture*

DAZZLING MULTIMEDIA

Dynamic sound, quality stereo speakers, microphone, and MPEG 1 support enhance multimedia presentations

SIX-SPEED CD-ROM

Advanced six-speed CD-ROM unleashes the power of multimedia with sound, video, text and graphics



*On select models.

Monte Carlo is a trademark of Fujitsu PC Corporation and Fujitsu and the Fujitsu logo are trademarks of Fujitsu, Ltd. The Intel Inside Logo and Pentium are registered trademarks of Intel Corporation. Microsoft, Windows, and the Windows logo are registered trademarks of Microsoft Corporation. All other trademarks or registered trademarks are property of their respective companies. ©1996 Fujitsu PC Corporation. All rights reserved.



LARGE, BRILLIANT SCREEN

With up to 12.1" SVGA active-matrix color display, and 2MB video RAM, visuals are crisp and text is sharp

FLEXIBLE CONNECTIVITY

PCMCIA slots offer expandability and connectivity while an IrDA-compliant port provides wireless data transfer

WORLDWIDE SERVICE & SUPPORT

Three-year limited warranty, including 24-hour, 7 days a week, toll-free technical support

Call **1-888-4-ON-THE-GO** ext. 2509

Visit us at www.fujitsu-pc.com or call QuikFacts fax on demand: 1-800-936-5209

FUJITSU
PC Corporation

{ See How Business Travels }

Fast Track, Milan.

Meet the **Milan** notebook from Fujitsu. High-performance models in a slim design.

You need to move with power, purpose and speed. These are the attributes you'll find in the Milan™ line of notebooks. The Milan notebook takes the lead with up to a 133MHz Intel Pentium® processor and expandable EDO RAM that handles your work with ease. Its removable lightweight Lithium Ion battery also keeps you going for up to 4.5 hours. With premium components and precision manufacturing, the Milan notebook is engineered for mobile comfort.

The Milan notebook from Fujitsu is backed by a three-year limited warranty, including 24-hour, 7-day toll-free technical assistance. All from Fujitsu, a \$36 billion global leader in information technologies. So when it comes to increasing productivity in your life, let the Milan notebook put you on the fast track.



MAXIMUM PERFORMANCE

*Up to 133MHz Intel Pentium processor,
level 2 cache* and up to 16MB expandable EDO
RAM all built on 32-bit PCI bus architecture*



BRILLIANT DISPLAYS

*SVGA color display offers
sharp text and graphics displayed
in crisp 800 x 600 resolution*



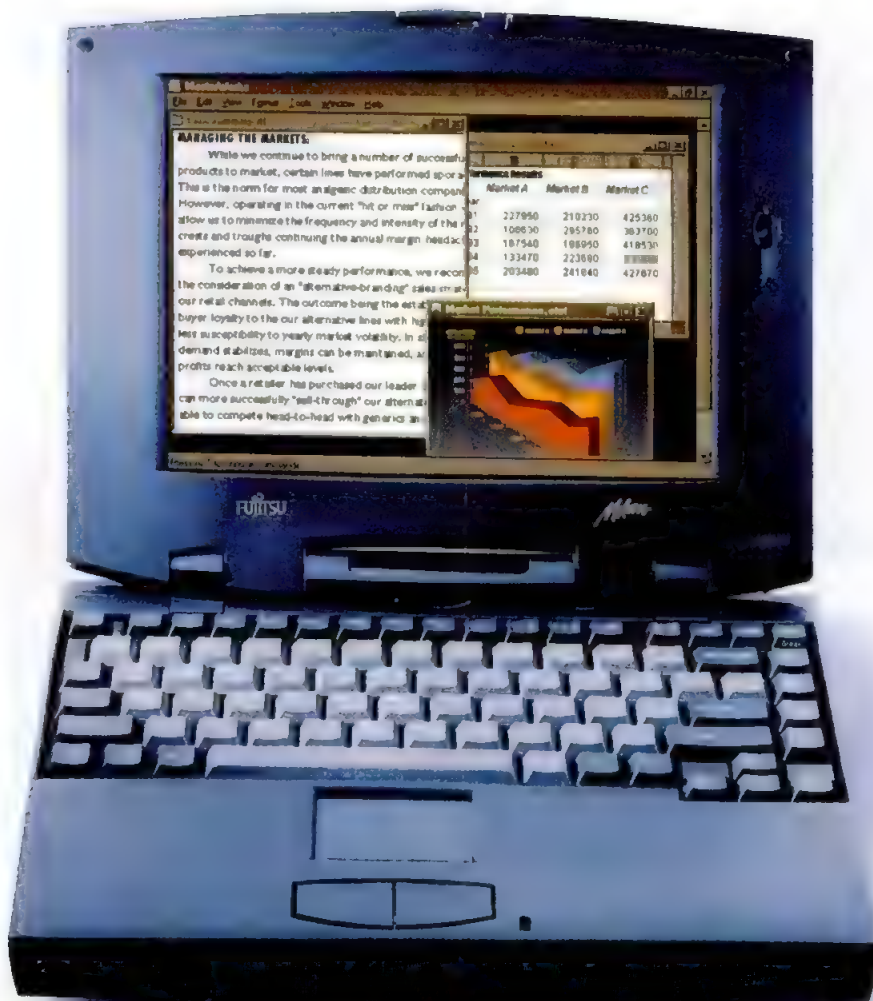
REMOVABLE LITHIUM ION BATTERY

*Lightweight, removable battery
provides up to 4.5 hours of battery
life to keep you going*



*On select models

Milan is a trademark of Fujitsu PC Corporation and Fujitsu and the Fujitsu logo are trademarks of Fujitsu, Ltd. The Intel Inside Logo and Pentium are registered trademarks of Intel Corporation. Microsoft, Windows, and the Windows logo are registered trademarks of Microsoft Corporation. All other trademarks or registered trademarks are property of their respective companies. ©1996 Fujitsu PC Corporation. All rights reserved.



OUTSTANDING STORAGE

Up to 1.2GB hard drive has ample room for all the applications and files you need to stay productive

FLEXIBLE CONNECTIVITY

PCMCIA slots offer expandability and connectivity while an IrDA-compliant port provides for wireless data transfer

WORLDWIDE SERVICE & SUPPORT

Three-year limited warranty, including 24-hour, 7 days a week, toll-free technical support

Call **1-888-4-ON-THE-GO** ext. 1509

Visit us at www.fujitsu-pc.com or call QuikFacts fax on demand: 1-800-936-5209

FUJITSU
PC Corporation

CIRCLE 224 ON READER SERVICE CARD

WEB UTILITIES

Rain or Shine?

WinWeather taps the resources of the Web to give you a personal weather forecaster.—By Edward Mendelson

By tapping into the meteorological resources on the Web, WinWeather (\$19.95), from Insanely Great Software, can give you the current weather in major cities around the world. A well-designed toolbar brings up satellite photos, radar maps, ski reports, and, for a few places, real-time weathercams.

You can configure WinWeather's interface to display only weather-status icons or a full

range of details. WinWeather offers forecasts and details like wind speed and atmospheric pressure for most U.S. cities.

Two-day forecasts pop up when you click on a city name or any of its icons. The interface departs slightly from the Windows standard. The upper-right-hand corner has only a minimize button, not a close button, and if you hide the toolbar, you can reach the configu-

City	Date	Temp	Hum	Wind	Weather	Fct
New York	26 JUN 95 2 AM EDT	+69°	AAA	BAZ	W.S.	Fct
Orlando	26 JUN 95 1 PM EDT	+88°	AAA	GSX	B	Fct
San Francisco	27 JUN 95 11 PM PDT	+53°	AAA	97%	W.S.	Fct
London	JUN 29 1995 1 AM	+58°	N/A	N/A	W.S.	Fct
Tokyo	JUN 29 1995 9 AM	+83°	N/A	N/A	W.S.	Fct

RAIN OR SHINE: WinWeather displays icons and details for weather in domestic and foreign cities. Clicking on a city or an icon brings up a detailed forecast.

ration menu only by right-clicking the title bar.

The program's main display is clear and configurable, and it packs multiple details into a compact window. For an even more compact display of only one city (in the U.S. only),

an alternative program to check out is Locutus Codeware's \$12 utility, WetSock, which puts a tiny weather-forecast icon in the system tray (www.wimsey.com/locutus).

Rain or shine, WinWeather is your Web weather source.

WinWeather. List price: \$19.95. Requires: 4MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or Windows 95, Internet connection. Insanely Great Software, Edison, N.J.; 800-319-5107, 908-548-5107; www.igsnet.com/igs. Circle 428 on reader service card.

INTERNET SOFTWARE

Net2Phone Makes the Call

Net2Phone connects Internet calls to circuit-switched telephone systems, but you won't hear a pin drop.—By Jon Hill

There are dozens of Internet phone programs available that allow two connected computer users to chat with each other. None of these, however, will help much if you need to speak with your computer-illiterate grandmother or a business associate in Burundi. IDT Corp.'s Net2Phone completes the link between the packet-switched Internet and the traditional circuit-switched telephone system, so you can reach out and touch any phone from your computer—at rates that would make Ma Bell blush. Due to poor audio quality, though, your grandmother may have trouble recognizing your voice.

Lacking such essential features as full-duplex capability, the current Net2Phone software pales in comparison with Internet-only telephony products. Only one person can speak at a time, and there's no automatic redialing, no personal phone books, and no ability to

use optional Codecs. While you can adjust sound threshold levels, there is no internal mechanism for adjusting microphone or speaker volume.

Net2Phone is a debit card-based product. While the software is free and downloadable from IDT's Web site (www.idt.net), without an IDT debit card you can call only toll-free numbers. All calls are routed through IDT's

servers in New Jersey and cost 10 cents a minute (off-peak) and 15 cents a minute (peak), regardless of country of origin.

International calls are based on IDT's rates from its New Jersey base of operations. Thus, a 1-minute call to California from Pakistan will set you back a dime, but a call within Pakistan costs \$1.11 a minute. Rates to high-volume locations (including Japan, Australia, and most of Europe) range from 15 to 35 cents a minute.

The 16-bit Windows-only software (a Mac version is under development) uses a phone metaphor. Net2Phone presents a depiction of a telephone touch pad; just click on the Touch-tone buttons.

While placing calls that spanned the globe as well as some in our own backyard, we found Net2Phone extremely easy to use. The current release has some obvious shortcomings, however. For one, once you've dialed a number, however incorrectly, you're stuck with it. If the line is busy, you must manually reenter your 10-digit debit card number and the number you wish to call every time until you get through.

Also, while you can mute the microphone, you can neither put a call on hold nor set up conference calls. Corporate users may be disappointed, because the software can't get through a firewall.

Audio quality ranges from nearly incomprehensible to something akin to that of AM radio. Net2Phone's relatively high bandwidth (10.4 Kbps), speech-only Codec doesn't handle nonspeech sounds very well. The current half-duplex product sounds more like a CB radio than a telephone.

Many of these complaints will be addressed in the next release of Net2Phone, which should be available by the time you read this. The new release will feature a more compact, full-duplex, echo-canceling Codec, and it will support Web-based links to Net2Phone, so users can dial toll-free numbers directly from an enabled Web site.

Aside from its poor sound quality, we found Net2Phone to be quite usable and economical, and it points the way to the future of Internet telecommunications.

Net2Phone. List price: Free. Requires: 4MB RAM, 1MB hard disk space, Microsoft Windows 3.1 or Windows 95, sound card, speakers and microphone, PPP Internet connection. IDT Corp., Hackensack, NJ; 800-438-8879; www.net2phone.com. Circle 429 on reader service card.



PHONE BOOTH ON THE NET: Net2Phone offers users the familiarity of a telephone's dialing pad.

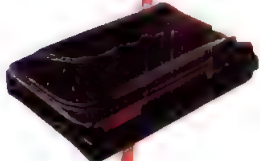
**The only time it slows down
is to take important calls.**

A speakerphone. A voice-mail system. A fax machine.

Combine them all with a fast, reliable U.S. Robotics modem, and you have a communication device which works almost as fast as you do.

The Sportster® Voice 28.8/33.6 Kbps Faxmodem gives you everything you need to access the information you want, when you want it.

Retrieve fax and voice messages remotely. Provide multiple-box voice mail. Create an extensive fax-on-demand menu. And, of course, access online services with remarkable speed.



Plus, unlike other modems, the Sportster Voice gives you the proven compatibility and reliability of Sportster, the number one selling modem in the world. It's easy to install and it's Microsoft Plug and Play certified.

What's more, the exclusive *Connections™* CD-ROM offers you a wide selection of online products for both home and office.

To learn more about the Sportster Voice, or any of the other ways U.S. Robotics helps you get what you want, when you want it, visit us at www.usr.com, or call us at 1-800-DIAL USR.

U.S. Robotics

DATA MODELING

Jargon-Free Modeling

InfoModeler places the emphasis on plain-English database queries.—By Sal Ricciardi

Asymetrix Corp.'s InfoModeler 2.0 captures rules, facts, and examples expressed either in modern graphical techniques or in plain English and then provides a two-way engine for generating and keeping users' physical databases and data models in sync. Given that support for entity-relationship diagramming is added to the object role-modeling technique pioneered by Version 1.0, it's difficult to imagine that any data modeler could not make good use of this product.

The \$3,195 Enterprise Edition supports all leading client/server and desktop databases and includes team support. The \$495 Enterprise Personal Designer Edition, however, is meant for standalone use and supports only desktop databases, omits

team support, and is limited to 40 tables.

InfoModeler lets you describe your database in a number of ways. You can enter simple English facts and examples that conform to object role-modeling conventions. You can also click and draw objects using the graphical design editor. InfoModeler has the ability to generate easily understood English descriptions of resulting designs.

We found that the program's new support for entity-relationship modeling using IDE1FX notation particularly welcome. A real time-saver is that you can now import entity relationship diagrams and models created with LogicWorks' popular Erwin product.

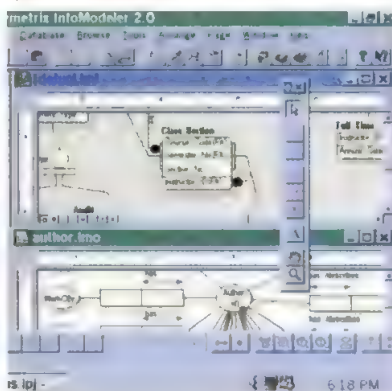
Veteran InfoModeler users will find this new release richer and

more powerful across the board. In addition to generating a physical database from an InfoModeler model, you can now generate a model from an existing database. More important, you can now migrate changes in both directions, synchronizing a model with its as-

and-drop operations, and zooming tools. The program makes good use of tabbed dialog boxes, and multiple toolbars provide fast dockable access to modeling tools and functions. InfoModeler stores information in a dictionary, and it can produce a wide variety of reports.

InfoModeler 2.0 is not without its weaknesses: The auto-layout feature is not always helpful, for instance. But the package is impressive, and most serious database designers will not want to be without it on their PCs.

InfoModeler 2.0. List price: Enterprise Edition, \$3,195; Enterprise Personal Designer Edition, \$495. Requires: 8MB RAM (16MB recommended), 20MB hard disk space, Microsoft Windows 95 or Windows NT 3.51. Asymetrix Corp., Bellevue, WA; 800-448-6543, 206-462-0501; www.asymetrix.com. Circle 403 on reader service card.



EASY READ: InfoModeler 2.0 supports entity relationship and object role modeling, expressed graphically or in plain English.

sociated database as changes occur over time.

You'll also find an improved user interface in Version 2.0, which includes support for multiple-selection alignment, drag-

STATISTICAL ANALYSIS

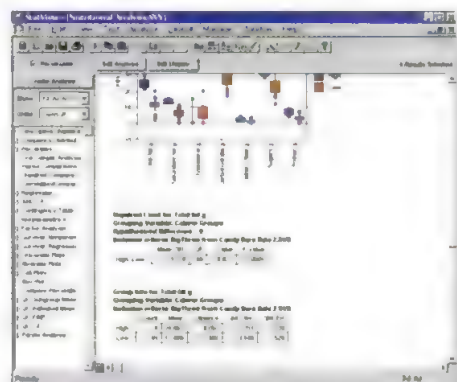
Statistics 101 Made Easy

StatView puts the prettiest face on statistical analysis.—By Barry Simon

StatView, Version 4.5 (\$595), is the first Microsoft Windows version of a program that has a leader in the Macintosh statistics market. It comes to the Windows world with a nicely implemented interface that makes it the friendliest statistics package we've seen. Its feature set isn't as extensive as that of market leader SPSS, but StatView has enough to meet the needs of most users.

No one even comes close to StatView's abilities to do data analysis quickly and set up templates easily. The analysis is done in two windows: datasheets and View. Datasheets are spreadsheet-like data tables. Above the data you can display the descriptive statistics (mean, standard deviation, max, min, and so on) for the data.

As you input new data, the tables update automatically. Second, you can define subsets of the data, name them, and switch between them from a pull-down menu.



ALL IN ONE: The view window contains a list of all procedures on the left, and both graphical and tabular output on the right.

The view windows are more eye-catching, with a tree of procedures on the left and output data in the larger right-hand window. There are palettes that let you browse the output by displaying output types sorted by variables used or analysis type. A drawing palette lets you jazz up the output for presentations.

The output is dynamically linked to the data, so that new data or restrictions are instantly reflected in the view window. This makes the program ideal for recurring analysis. Any view window can be saved as a template to allow the easy application of all the graphs and procedures in the window to any data set. And the program ships with more than 80 templates.

Among supported procedures are ANOVA, ten nonparametric analyses, more than ten quality-control procedures, factor analysis, and survival regression. Graphs include box-whisker, pareto, scatter, and histogram, and the standard pie, bar, and line. But there are no 3-D graphs. The program has some interface elements that belie its Macintosh roots. The right mouse button is hardly used, the dialog boxes have a nonstandard look, and the program uses some strange keystroke combinations.

Those with industrial-strength needs may find it falls short, but for the bulk of users, StatView has quickly become the statistical product of choice.

StatView, Version 4.5. List price: \$595. Requires: 8MB RAM (12MB for Windows NT), 8MB hard disk space, Microsoft Windows 3.1, Windows 95, or Windows NT. Abacus Concepts, Berkeley, CA; 800-666-7827, 510-540-1949; www.abacus.com. Circle 402 on reader service card.



THE average airport has 6.3 miles of terminals.
It occurred to us you might want a lighter notebook.

The new 5.8-pound, full-featured AcerNote™ Light.



Designed for

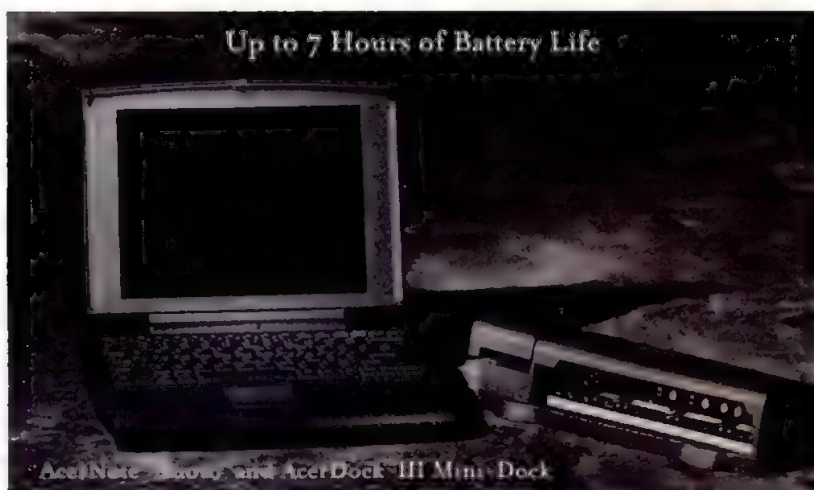
Microsoft®
Windows®95



1-800-848-ACER www.acer.com/aac/

©1996 Acer America Corporation. Acer and the Acer logo are registered trademarks and AcerNote is a trademark of Acer America Corporation and Acer Inc. The Intel Inside Logo and Pentium are registered trademarks of Intel Corporation. Microsoft, Windows and Windows logo are registered trademarks of Microsoft Corporation.

CIRCLE 034 ON READER SERVICE CARD



AcerNote Nuovo 133MHz Pentium Processor

Interchangeable CD-ROM and floppy drive, full-size keyboard—and up to seven hours of battery life.

- 11.3" Dual Scan Color Display
- 16MB EDO RAM (64MB Max)
- 1.2GB Hard Drive
- Internal 6x CD-ROM Interchangeable with Floppy Disk Drive
- 256KB L2 Cache
- 7.0 Pounds
- Lithium Ion Battery with up to 7 Hours Battery Life*
- 2MB Video RAM Performance
- 2Type II/1Type III PCMCIA Slots
- 16-Bit Sound Blaster Audio with Built-In Stereo Speakers
- 3-Year Limited Warranty/1-Year Rapid Repair
- **28.8 Fax Modem Built-In**

\$3499

AcerNote Nuovo 133MHz Pentium Processor

- 11.8" Active Matrix Color Display
- 16MB EDO RAM (64MB Max)
- 1.2GB Hard Drive
- Internal 6x CD-ROM Interchangeable with Floppy Disk Drive
- 256KB L2 Cache
- 7.0 Pounds
- Lithium Ion Battery with up to 7 Hours Battery Life
- 2MB Video RAM Performance
- 2Type II/1Type III PCMCIA Slots
- 16-Bit Sound Blaster Audio with Built-In Stereo Speakers
- 3-Year Limited Warranty/1-Year Rapid Repair
- **28.8 Fax Modem Built-In**

\$3999



Under six pounds, but a heavyweight worker with an Intel® Pentium® processor, full-size keyboard, 16-bit audio and internal floppy drive.

AcerNote Light 100MHz Pentium Processor

- 10.4" Dual Scan Color Display
- 8MB EDO RAM (40MB Max)
- 810MB Hard Drive
- 5.8 Pounds
- Duracell® NiMH Battery
- 1MB Video DRAM
- 2Type II/1Type III PCMCIA Slots
- 16-Bit Sound Blaster® Compatible Audio
- 3-Year Limited Warranty/1-Year Rapid Repair
- **Double your RAM to 16MB for \$200 with Free Installation**

\$1699

AcerNote Light Multimedia 120MHz Pentium Processor

- 11.3" Dual Scan Color SVGA Display
- 16MB EDO RAM (64MB Max)
- 1GB Hard Drive
- 6.2 Pounds
- Lithium Ion Battery
- Internal 6x CD-ROM
- 2Type II/1Type III PCMCIA Slots
- 16-Bit Sound Blaster Compatible Audio
- 3-Year Limited Warranty/1-Year Rapid Repair
- **Upgrade to 133MHz and an Active Matrix Screen for an Additional \$500**

\$2499

AcerDock III Mini-Dock

- Easy One-Step Connection and Warm Docking
- Ports for Printer and External Floppy Disk Drive, plus Serial Port
- PS/2 Mouse and Keyboard Ports
- RJ-11 Jack for Modem and Phone Line
- Joystick/MIDI Port
- For AcerNote Nuovo Only
- **Built-In 10BASE-T Ethernet with RJ-45 Port**

\$299

Business leasing available for all models.



TO ORDER, CALL
1-800-848-ACER

6am-6pm Weekdays, 8am-4pm Saturday Pacific Time



©1996 Acer America Corporation. Please call 1-800-848-ACER for details on the limited warranty. Return shipping and insurance charges are the responsibility of the customer. Not available outside U.S. and Canada. Products, availability, prices and programs are subject to change or cancellation without notice. Shipping and handling charges are extra. Acer and the Acer logo are registered trademarks and AcerNote, Nuovo and AcerDock are trademarks of Acer America Corporation and Acer Inc. The Intel Inside Logo and Pentium are registered trademarks of Intel Corporation. Microsoft, Windows and Windows logo are registered trademarks of Microsoft Corporation. All other brands and product names are trademarks of their respective companies. *Independent cross-country battery testing conducted by VeriTest, Inc., June 1996.

CIRCLE 076 ON READER SERVICE CARD

INK JET PRINTERS

Small Printer, Big Job

Tally's T7070 produces up to tabloid-size prints, but it does so slowly.—By Daniel Grotta and Sally Wiener Grotta

The \$1,699 Tally T7070 is an inexpensive color ink jet printer whose small footprint belies its ability to produce tabloid- and broadsheet-size prints. Although its output isn't perfect and the pages come out slowly, the T7070 is a workhorse that can churn out large color prints.

The T7070 uses Canon's Bubblejet technology to produce up to 360-dot-per-inch (360-dpi) black-and-white or color prints. Its chief competitor, the \$995 Epson 1500, has a piezoelectric print head that can print with resolutions up to 720 dpi.

PAPER: YOUR CHOICE

The T7070 can handle a wide range of paper sizes and types. It can output to manually fed sheets and continuous-form paper of up to 16 inches wide. The T7070 can also use single or dual automatic sheet-feeder bins for sheets and even envelopes as large as 18 by 23 inches.

The printer has settings for use with a variety of stocks: plain, coated, glossy or high-gloss paper, transparency backlight film; and even recycled paper. The sheet-feeder bins, however, are optional with the T7070. If you don't have feeder bins for all the paper sizes that you plan to use, you'll end up feeding sheets into the T7070 manually, one at a time—an arduous process.

Installation of the printer takes only a few seconds. The front panel doesn't have an alphanumeric display, but it does have various LCD icons that report the printer's status.

The T7070's control buttons turn the power on and off, put the printer on- or off-line,

change paper source, adjust fonts, and start print-head cleaning, among other functions. Communications with your PC is a two-way street, because the T7070 uses a bidirectional printer port—provided you have the correct cable, which isn't included with the printer. The T7070 also reports job status to your computer screen.



sealed front compartment for storing a second cartridge so it doesn't dry out. Ink can become expensive, however, because the ink cartridges are relatively small and run out quickly when making large prints.

Typical per-page ink costs range from \$4 for an 17-by 22-inch print at full color coverage to 7 cents for an 8.5-by 11-inch print at 20 percent coverage. Tally specialty papers range in price from 75 cents per sheet for 8.5-by 11-inch stock to \$4 for an 17-by 22-inch poster.

During testing, we were pleased with the ability to customize the T7070's interface. We

we lowered the resolution to 180 by 180 dpi or even to 90 by 90 dpi (draft mode), the print speeds remained almost identical. In addition to its lack of speed, the T7070 automatically goes off-line after printing a sheet, so you have to hit the on-line button before you can resume printing.

The result is that making color prints with the T7070 becomes an exercise in patience and sometimes frustration. When outputting to tabloid- or broadsheet-size paper, it took just over 30 minutes to turn a vector file into an 18-by 23-inch color print.

RANGE OF RESULTS

Print quality ranged from good to awful, depending on the subject. The T7070 performed best with well-lit photorealistic images, but illustrations with dark type on a subdued background yielded disappointing results, particularly when compared with the output of the Epson 1500.

The T7070's prints showed a considerable amount of white banding around the letters on several pages, and Tally's coated paper is too thin for producing high-saturation prints. No matter how careful we were, the tabloid- and broadsheet-size pages ended up creased, wrinkled, and buckled because of excess ink.

The T7070 is not a PostScript device, although Tally recently showed a Macintosh PostScript driver for the T7070. The printer includes only six built-in fonts, but the printer comes with a CD-ROM filled with typefaces. It also comes with Epson LQ-2550 and IBM XL24E emulation modules.

The Tally T7070 is a step in the right direction for low-cost, large color prints, but it still has a way to go before it satisfies the needs of graphics professionals.

Tally T7070. List price: \$1,699. Requires: PC with parallel port, Microsoft Windows 3.x or Windows 95. Tally, Kent, WA; 206-251-5500; www.tally.com. Circle 407 on reader service card.



LITTLE BIG PRINTER: The T7070 is an ink jet printer capable of producing stunning, large-format color prints, but it stumbles on illustrations and dark images.

Tally offers two ink cartridges for the T7070: one black, the other a combination of black and color. Unlike with many other printers, cartridge installation is virtually foolproof: Just push a button on the front panel that moves the print head out of the way, flip the green lever, push the cartridge in and you're ready to print.

For those who alternate cartridges frequently, there's also a

set a variety of parameters: paper type, ink, resolution (90 by 90 dpi to 360 by 360 dpi), document type (business graphics, graphic-art, photographic image, draft, customized), seven different halftone or dithering settings, and a variety of image settings (brightness, contrast, color balance/correction, and red, green, blue, and saturation controls).

Don't expect a speed demon at this price. On our tests, a typical single-spaced page of type took 2 minutes, 49 seconds, in fine mode with the color cartridge in place; speed improved to 1 minute, 11 seconds, by using the black-ink cartridge. When

“3” Three-peat

Unprecedented Winner of
3 Editor's Choice Awards in 1996



September 24, 1996
SAG STA Pentium Pro 200



February 20, 1996
SAG STF 166 Pentium



February 20, 1996
SAG STF 150 Pentium

SAGE
ELECTRONICS

Award Winning
Custom-Configured Systems
at Off-the-Shelf Prices.

1.800.989.3475



Want a custom system?
Until SAG, that meant high-priced VARs and other costly consultants.

Want to save money without compromising on quality?
Until SAG, your only options were pre-configured systems and their many limitations.

Precision-Engineered Power Systems

Now you can have custom quality configurations without compromise. All SAG workstations and systems are precision-built and packed with features. We offer the latest in technology with speed, data integrity, and compatibility in mind.

For affordable disk arrays, tape backup solutions and RAID 5 technology, SAG Electronics is the acknowledged "High-End Solutions Company."

The Choice Web Server
Companies like *Business Week Magazine* are choosing SAG Electronics as their high performance web server solution.



Quad Pro 200MHz	Dual Pro 200MHz SMP	Pro 200 Workstation	Dual Pro 200MHz SMP RAID 5	Dual Ultra Graphics 200MHz
2 Intel Pentium® Processors Exp. to 4	Contains Intel's New Pentium® Pro Motherboard Built-in Expandability with SMP Memory Chipset	1 Intel Pentium® Pro Processor	1 Intel Pentium® Pro 200MHz Processor, Upgradable to 2 CPUs	Imagine 128, Fastest Graphics, Drive Supports Intel Pentium 200, 166MHz Pentium Processor
64MB of ECC 4 way interleaved Memory to 1GB	1 Intel Pentium® Pro 200 Processor	32MB of 60 NOS EDO RAM Expandable to 128MB	64MB of 60 NOS RAM Expandable to 512MB	1 Intel Pentium® 200MHz Processor, Upgradable to 2 CPUs
Slots (6): PCI (4) EISA	32MB of 60 NOS RAM Expandable to 512MB	ECC Supported	ECC Supported	Timm II Chipset
Adaptec 2940 UAW	ECC Supported	SLOTS: (4) PCI, (4) ISA	3 4GB Ultra Wide Removable HD	16MB RAM Expandable to 256MB
9 1GB 7200RPM Ultra Wide HD	Imagine 128 Series II 4 MB VRAM	3.26B 5400 RPM 9.5ms HD	3 Channel UAW RAID 5 Controller	Slots (4): PCI, (4) EISA
8x CD-ROM	Open Slots: (3) PCI, (1) ISA	Matrix 2MB WRAM Video	Open Slots: (3) PCI, (1) ISA	Sony 8x CD-ROM
#9 2MB DRAM Video	Adaptec 2940 Ultra Wide Controller	16 Bit Sound Card	#9 2MB DRAM Video	Floppy, Mouse
8GB DAT Drive	16 Bit Sound Card	16 Bit Sound Card	10 Bay tower 300 Watt Redundant Power Supplies	Imagine 128 Series II 128 Bit "3D" 4MB VRAM Video
Quad PCI Ethernet 10/100	4 1GB Ultra Wide SCSI HD	Sony 8x CD-ROM	Intel 10/100 Ethernet	2940 UAW
Floppy, Keyboard and Mouse	Intel 10/100 Ethernet	Keyboard, Floppy, Mouse	Sony 8x CD-ROM	2.1GB Ultra SCSI Wide HD (8.5ms)
12 Bay Tower 450 Watt Power	Sony 8x CD-ROM	Midtower	Hardware Monitoring Utility	32 PMP Sound
	Keyboard, Floppy, Mouse		Keyboard, Floppy, Mouse	Midtower Case
	Hardware Monitoring Utility			IMAG 1701XT Monitor
	Tower Case 300 Watt			\$3430
\$10700	\$3473	\$2159	\$7449	Single Processor Motherboard Solution \$3180

AT&T on site and 4 year extended warranties are available. Lease options available. Returns may be subject to restocking fee. BIOS must be acquired. Some devices have not been approved by the Federal Communications Commission. These devices are not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained. CNA Schedule #CS 15F 1103D

SAG Electronics • 451 Andover Street • North Andover, MA 01845 508-682-0055 Fax 508-689-0180

Hours: 8:30am-7:00pm, Monday-Friday EST

5 Year Limited Warranty <http://sagelec.com>

UTILITIES

Perfectly Addressed Mail

Address Fixer corrects and formats mail addresses, speeding your mail on its way.—By Gerard Mackey

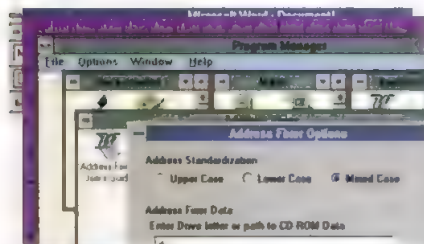
CoStar's \$29.99 Address Fixer provides an easy way to improve the chances that your mail will get to its destination by giving it the correct address, in-

a Check Address item to the Tools menu of Microsoft Word. The program, which acts somewhat like a spell-checker, corrects the ZIP code if it's wrong. The pro-

gram goes a step further than Insight Software's ZIP Express (First Looks, August 1996), by changing any street addresses or state names to conform with Postal Service standards. For example, Address Fixer changed Calif. to CA; similarly, Road became Rd., and Suite

500 became #500.

For the program to work properly, you must compose addresses



YOUR CHOICE: Address Fixer lets you choose to have address lettering in all uppercase or all lowercase, or in a combination of the two.

cluding proper formatting and the exact nine-digit ZIP+4 code.

Address Fixer works by adding

CAD

Instant Desktop Designer

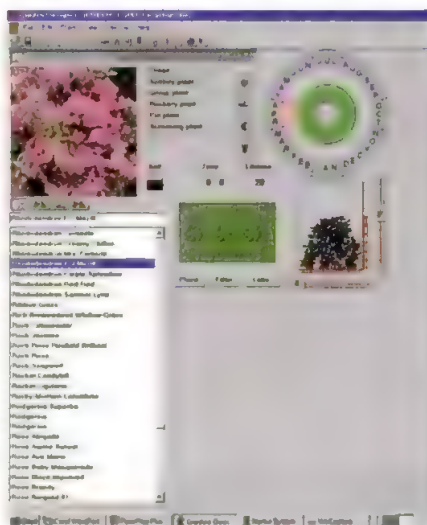
FloorPlan Plus 3D can turn anyone into an amateur designer.—By Daniel Grotta and Sally Wiener Grotta

MSI's \$49.95 FloorPlan Plus 3D is jam-packed with sophisticated design features and lots of extras, but it falls short in terms of integrating its elements.

The program can create rooms and buildings (up to 20 stories high) in 2-D but lets you view them only in 3-D. The cartoonish 3-D portion of FloorPlan is really meant to show design. The floor plans you produce can be exported to CAD formats for more intensive 3-D work.

Included are 200 book-based and 1,001 CD-based home plans (101 of which can be altered), and a library of

hundreds of styles and symbols (such as windows, appliances, and furniture). It took us less than five minutes to add several exterior



GREEN THUMB: FloorPlan includes a program for designing your garden.

in a standard way: If you fail to place the comma between city and state, Address Fixer doesn't respond when you click Check Address. And it capitalizes letters you might prefer to be in lowercase—Avenue Of The Americas, for example. It can also check only one address at a time, so a large mail-merge can take time and patience. CoStar's more sophisticated AddressMate Plus is capable of checking multiple addresses.

Unlike ZIP Express, Address Fixer knows the ZIPs for addresses in large cities as well as those in rural areas. The program is the best way to avoid seeing "Return to Sender" stamped on your mail. **Address Fixer.** List price: \$29.99. Requires: 4MB RAM, 1MB hard disk space, Microsoft Windows 3.1 or Windows 95, Microsoft Word 6.0 or 7.0, Microsoft Office for Windows 4.2 or for Windows 95, CD-ROM drive. CoStar Corp., Greenwich, CT; 800-426-7827, 203-661-9700; www.costar.com. Circle 404 on reader service card.

and interior wall styles to the library. Most noteworthy is the ease with which spiral staircases, curved walls, and roofs can be included. In some instances, the program offers dialog boxes for specifying the exact characteristics of an object; at other times, you must draw the object by hand.

The included Garden Designer is a separate program that doesn't accept FloorPlan Plus files; you must start from scratch when using it. Plant Encyclopedia helps users select plants by soil type, climate, size, and other criteria, but oddly enough there is no mention of either lilacs or blue spruce. The garden is viewable by month, so you can see changes from season to season.

Despite some limitations, FloorPlan Plus 3D is a valuable tool for armchair architects.

FloorPlan Plus 3D. List price: \$49.95. Requires: 4MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later. IMSI, San Rafael, CA; 800-833-4674, 415-257-3000; www.imsisoft.com. Circle 405 on reader service card.

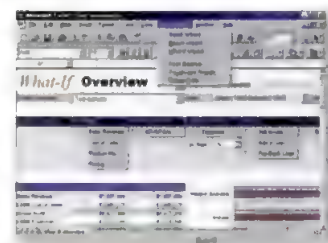
ACCOUNTING

Excel-erate Your Books

SBFM gives your accounting software the power of Excel.—By Kathy Yakal

Microsoft's \$100 Small Business Financial Manager (SBFM) piggybacks on your accounting software to use the analytical abilities of Microsoft Excel for Windows 95.

SBFM inserts a trio of wizards into the Excel menu: The Import Wizard brings data files into Excel from your accounting program. The Report Wizard builds customizable reports and analysis tables; the What-If Wizard lets you play out financial scenarios.

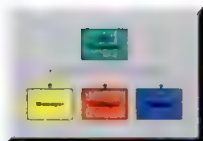


SMART ACCOUNTANT: SBFM taps Excel to analyze accounting data.

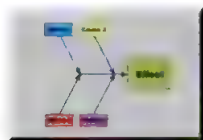
Two drawbacks mar SBFM: The program requires the latest version of Excel, but it doesn't work with the most recent versions of accounting programs. Supported programs include BusinessWorks for DOS and Windows 9.0, DacEasy Accounting for DOS 5.x, Peachtree for Windows 3.0, and QuickBooks 3.x. And operations are slow.

For those who watch every penny, Small Business Financial Manager is like a PC auditor.

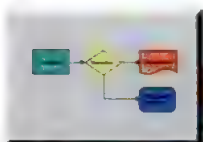
Microsoft Small Business Financial Manager. Street price: \$100. Requires: 8MB RAM, 10MB hard disk space, Microsoft Excel for Windows 95, Microsoft Windows 95 or Windows NT. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com. Circle 408 on reader service card.



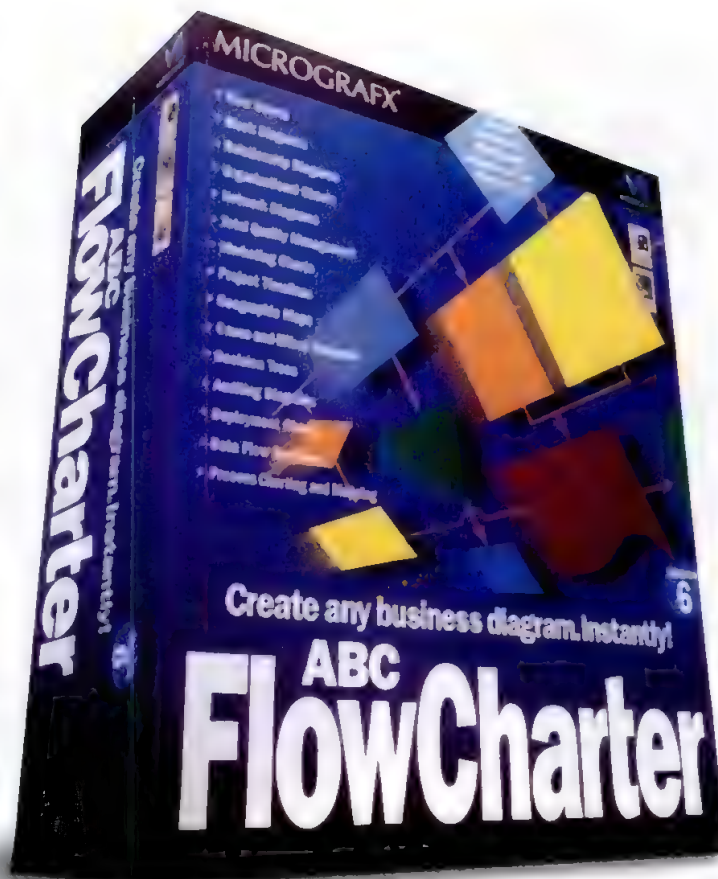
Human resource tools like organization charts and relationship diagrams



Management support diagrams like cause & effect, decision trees and timelines



Business process re-engineering diagrams like flow charts and data flow diagrams



Marketing tools like venn diagrams, targets, pyramids and geographic diagrams



Total quality management diagrams like process charts and maps



IT and software design tools like network diagrams and object oriented design diagrams

ROCKET FUEL FOR THE BUSINESS PROCESS

Great businesses run fast. As fast as you can make obstacles disappear. That's why you need ABC FlowCharter® 6. It shows you your business. Clearly. With diagrams that add a boost to your entire business process.

ABC FlowCharter is not just another drawing tool. It actually lets you relate charts to data, and automatically analyze the results. Unlike diagramming tools that hit the wall at the edge of the page, ABC FlowCharter is powerful. It can diagram any process. Across any number of pages. No matter how complex. With lines that re-route automatically and shapes that drop into place. In fact, it's so powerful,

it's used as the engine for Process Model®—the world's most advanced business simulation tool.

ABC FlowCharter does the work, while you work on making your business run better. See for yourself. Pick up your copy of ABC FlowCharter 6 today. If you want even more graphics power, you'll find ABC FlowCharter bundled in ABC Graphics Suite™. Visit your favorite reseller, or call 800-428-8711 now.



MICROGRAFX®
www.micrografix.com



COMPUSA
THE COMPUTER CONNECTION
1-800-COMPUSA

COMPUTER 
1-800-THE CITY

EGGHEAD SOFTWARE
1-800-EGGHEAD

The Pentium chip-based
PC reaches a new level.
Affordability.

DELL DIMENSION™ P200v
200MHz PENTIUM® PROCESSOR

- 16MB SDRAM Memory
- 256KB Pipeline Burst Cache
- NEW 2.1GB Hard Drive [10.5ms]
- 15TX Trinitron Monitor (13.7" v.l.s.)
- 64-bit PCI 2MB DRAM Video
- 8X EIDE CD-ROM Drive
- Microsoft® Windows® 95/MS® Plus! CD/
- 30 Days Free Support/Dell Mouse

- 3 Year Limited Warranty*
 - Upgrade to 32MB SDRAM, add \$225.
 - Upgrade to a 3.2GB hard drive, add \$119.
 - 28.8 Data/Fax modem, add \$129.
 - ACS-5 Speakers and Sound Blaster 16 PnP Sound, add \$99.
- Business Lease†: \$74/Mo.
Order Code #500333

THINK A P200 IS OUT OF REACH?



AT THIS PRICE, YOU WON'T EVEN HAVE TO STRETCH.

High-end performance for under \$2000? What's the catch? There isn't one. A Dell Dimension P200v will give you the fastest Pentium processor available. That's right, 200MHz. Not to mention a Trinitron monitor, 8X CD-ROM and award-winning service and support. All this can be yours for a mere \$1999. OK, we admit there is one little catch. To get it, you'll have to call.



DELL

TO ORDER

800-601-3355

<http://www.dell.com>

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm In Canada, call 800-233-0702

Keycode #04325

*For a complete copy of our Guarantees or Limited Warranties, please write Dell USA L.P., 2214 W. Braker Lane, Suite D, Austin, TX 78758. †Business leasing arranged by Leasing Group, Inc. *Prices and specifications valid in the U.S. only and subject to change without notice. The Intel Inside logo and Pentium are registered trademarks of Intel Corporation. MS, Microsoft, Windows and the Windows logo are registered trademarks of Microsoft Corporation. ©1996 Dell Computer Corporation. All rights reserved.

WEB SEARCH UTILITIES

The Smart Web Searcher

EchoSearch reaches across multiple search engines to find what you're looking for.—By David Haskin

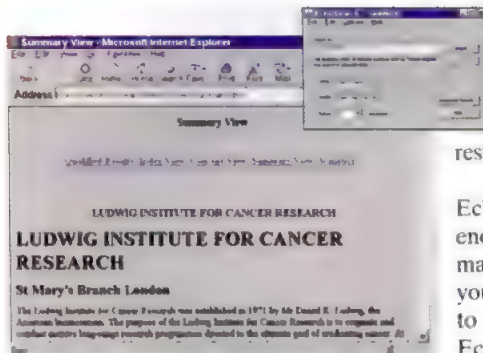
The \$49.95 EchoSearch 1.0 can save you from the time-consuming task of wading through search results by analyzing the contents of sites found by multiple search engines and then creating descriptions of them.

EchoSearch submits your search request to such popular Web search engines as AltaVista and Lycos. Instead of simply listing the sites that match your criteria, however, EchoSearch creates text-only replicas of matching pages, which it stores on your hard drive. By applying linguistic analysis to those pages, the program automatically generates an index summarizing the contents of each page.

Like Quarterdeck's WebCompass, EchoSearch's summary page

abstracts a key sentence or two from each site. But EchoSearch goes a step further, creating an index, similar to one found in the back of a book, that lists site contents. A separate view displays the key concepts from your search that are associated with each page. EchoSearch maintains all the links in these locally stored pages.

EchoSearch is a Java application and was laudably fast, querying multiple search engines simultaneously. Using a 28.8-Kbps modem connection, it required only 3 minutes to find and process 20 Web sites. Its locally stored summary pages were largely accurate. In most cases, we learned enough about the site that we didn't have to jump to it.



AUTOMATIC INDEX: EchoSearch (above) displays search results in your browser in several views, including site summaries. Simply enter a word or phrase (upper right).

EchoSearch's first-come, first-served approach to collecting and processing Web pages offers no relevancy weighting beyond that built into the search engines themselves. The search process can generate somewhat random results depending on the speed of your connection and the amount of traffic. On our tests, one user with a T1 connection and another with a modem connection conducted

identical searches at the same time with completely different results.

Searching with EchoSearch is simple enough, but its results may initially confuse you. After you learn to use it, though, EchoSearch not only tells you what your Web searches have found but provides enough information to determine whether

the information is useful.

EchoSearch 1.0. List price: \$49.95. Requires: 8MB RAM (16MB recommended), 8MB hard disk space, Microsoft Windows 95 or Windows NT, 32-bit browser (Netscape Navigator 2.0 or later recommended). Iconovex Corp., Bloomington, MN; 800-943-0292, 612-896-5100; www.iconovex.com/e33. Circle 426 on reader service card.

GRAPHICS UTILITIES

Your PC's Photo Album

DisplayMaster creates digital slide shows, complete with captions.—By Daniel Grotta and Sally Wiener Grotta

DisplayMaster offers a quick and easy way to transport and display photos and graphics from computer to computer—using only floppy disks. This \$50 program creates minislide shows and even multimedia presentations that can be used by any computer running Microsoft Windows, OS/2, or Macintosh.

Using DisplayMaster is not difficult, but it's not especially intuitive either. You can add pictures to your presentation from a wide range of file formats. But the icons at the bottom of the screen are not organized in any standard way, nor is there a status bar to explain their functions. The caption utility, which offers no control over font style or size, creates a crude-looking white text box. You can add a watermark if you're concerned about copyright, but the best protection

you have is that these are screen resolution pictures (25K to 50K JPEG files), and they don't contain enough information to create quality printouts.

It takes only a few minutes to create a disk-based presenta-

tion, portfolio, or photo album of as many as 50 pictures. After automatic formatting, the file can be read by almost any desktop computer; DisplayMaster need not be installed. Viewing is simple, but not idiot-proof. The playback screen has a status bar identifying the icons, but the play, stop, rewind, show captions, and other buttons are not clearly labeled or organized in an easily accessible way. DisplayMaster does not give the author the ability to make slide shows read-only.

With the exception of the text boxes, DisplayMaster's presentations are good-looking. Despite its lack of finesse, the program is a useful, inexpensive, and easy-to-use tool for artists, salespeople, families, and others who want to share pictures.

DisplayMaster. Street price: \$50. Requires 4MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later. FS Photo Inc., Vienna, VA; 800-226-6490, 703-356-9858; www.floppyshots.com. Circle 427 on reader service card.



DisplayMaster makes it easy to create slide shows or distribute photos on floppy disks.

You can attach notes to photos, but DisplayMaster does not provide formatting options.

Toolbar buttons allow you to export or delete photos, edit captions, rotate images, and start a slide show, or you can navigate through the albums manually.

configure 1

Full-Function
Notebook
Lithium Ion
Battery
Internal
Diskette Drive

configure 2

Multimedia
CD-ROM
3 Lithium Ion
Batteries
16-Bit
Stereo Sound
Dual
Speakers
NTSC/PAL
TV Output

Choice of SVGA
displays from
11.3" CSTN
to 11.8" TFT.

Up to
133 MHz
Pentium®
processor,
hard drives
up to 1 GB.



Detachable
lithium ion
battery
also
functions
as a
handle
and a
keyboard
tilt.

This base is
detachable
and houses the
CD-ROM.



Dual speakers
integrated in
the CD base
provide 16-bit
stereo sound.

THE COMPAQ ARMADA 4100. IF IT'S

It's your call. On one hand, it's a full-function notebook. Or in a snap it's multimedia with CD-ROM. Or it's lean and mean. It also fax machines* and dual speakers for incredible 16-bit stereo sound. And it's Internet-ready. The new Compaq Armada 4100. It's how to



©1996 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. SpeedPak and Armada are trademarks of Compaq Computer Corporation. *Speakerphone and answering machine require Compaq SpeedPak 288 Telephony Modem, available in Summer 1996. Fax machine requires modem. The Intel Inside Logo and Pentium are registered trademarks and the Pentium Processor Logo is a trademark of the Intel Corporation. Other products mentioned may be trademarks of their respective companies.

~~configure~~ 3

Slimline
5.1 Lbs.
1.5" Thick

~~configure~~ 4

Rest
Relaxation
Peace of Mind



*Touchpad
can be
replaced
by an optional
trackball.*

*Memory
expandable
up to
48 MB.*

*Internal diskette
drive is replaced
by a battery.*



NOT ONE THING, IT'S ANOTHER.

provides for three batteries with up to 10 hours of life. It's a virtual office too—complete with a full duplex speakerphone, answering and conquer the task at hand. One way or another. For more information, call 1-800-853-9521. Or visit our site at www.compaq.com.

COMPAQ

Has It Changed Your Life Yet?

WinFax PRO

Just hit one key and WinFax™ PRO will fax out literally hundreds of multi-page newsletters, press releases, invoices or purchase orders.

In fact, one click is all it takes to reach out to new customers, stay in touch with existing ones and get more business from them all.

Since your faxes are sent directly from your PC, they look far more professional. And so do you. Our award-winning fax software even integrates fax numbers from contact manager programs like ACT! so you don't have to key them in again.

WinFax PRO runs on Windows 3.1, Windows 95 and on small office networks. So your whole office can fax from their PCs without an extra phone line at each desk. Look for WinFax PRO at your local computer store and in CommSuite™, Symantec's integrated communications package.

For a free guide to growing your business with WinFax PRO, call 1-800-453-1183, ext. 9195 or visit us at www.symantec.com.

That way, you'll always end up looking like the guy on the left. Even if your business suits aren't quite as spiffy.



SYMANTEC.



You just spent 5 hours
with a fax machine
to get your newsletter to
167 prospective clients.

You just found out you
didn't have to.

Second Looks

LIVING WITH THE PRODUCTS WE REVIEW

By Brian Nadel

INTERNET APPLICATIONS

A Kinder, Gentler PointCast

OUR PRAISE FOR POINT-
Cast network's ability to person-
alize and deliver periodic news
reports, sports scores, weath-

day Morning Syndrome. Imagine
how quickly a corporate network
will become bogged down when
hundreds of employees switch on
their PCs bright
and early Monday
morning and immedi-
ately download the
weekend's happen-
ings from the Point-
Cast Network ([www
.pointcast.com](http://www.pointcast.com)).

The problem is so
severe that several
large corporations
have limited or even
outlawed the use of
PointCast on their
desktop PCs. But we found that
how you configure and use Point-
Cast has a big impact on how
kind the program is to your com-
pany's network—and its adminis-
trators. So in the interests of pre-
serving good relations with your

company's MIS crew, Second
Looks has prepared a primer on
how to make PointCast more
network-friendly.

- **Update manually.** Set the pro-
gram to download on demand
and, when you want a fresh news
fix, click on the Update button lo-
cated on the main screen. Using
this hit-and-run approach means
you won't overwhelm the net-
work at the start of the day or at
the top and bottom of the hour.

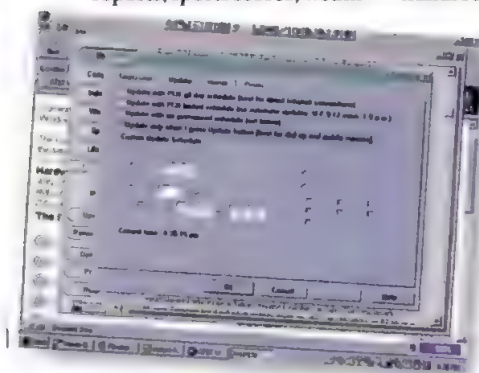
- **Minimize downloads.** If you
must configure PointCast to fetch
news automatically, set the
download frequency to every
couple of hours or so, not to the
program's half-hour minimum
interval. For example, if you want
regular weather reports, schedule
updates for just after 6:30 A.M.
and 2:00 P.M.—the two points in
the day when weather data is re-
freshed.

- **Leave your PC on.** Another trick
is to leave your PC on over the
weekend, if your network allows
it. This way, your PC isn't infor-
mation-starved come Monday

morning, and it won't need an im-
mediate data fix.

- **Consider proxy servers.** Some
companies are dedicating a
caching proxy server to PointCast
downloads. Using a proxy server
funnels all the PointCast traffic
through one IP address and can
be an economical way to reserve
as much of the network's pre-
cious bandwidth for business ac-
tivities as possible.

In the meantime, PointCast is
revamping the program to reduce
its network load by about 50 per-
cent, and the company will soon
unveil its I-Server, a homegrown
proxy server that bundles re-
quests for similar information
into consolidated downloads.
Despite a big appetite for band-
width, PointCast is a news
junkie's dream.



er, and more to the desktop via
the Internet is rivaled only by the
scorn with which this application
is viewed by network administra-
tors (First Looks, July 1996). The
problem revolves around what
has come to be called the Mon-

day Morning Syndrome. Imagine
how quickly a corporate network
will become bogged down when
hundreds of employees switch on
their PCs bright
and early Monday
morning and immedi-
ately download the
weekend's happen-
ings from the Point-
Cast Network ([www
.pointcast.com](http://www.pointcast.com)).

PDA's

A Facelift for Your PDA

WHETHER IT'S THE HP OMNIGO 100
(First Looks, February 6, 1996), the Sharp
Zaurus ZR-5000 (First Looks, May 16, 1995),
or U.S. Robotics' Pilot 5000 (First Looks,
May 14, 1996), the PDA's weak link has al-
ways been its screen. No larger than a few
inches across, the monochrome LCDs can be
hard to read, and using a stylus on the slippery
glass surface hardly has the comfortable feel
of pencil on paper.

A company called Concept Kitchen has come up
with WriteRight, a series of clear plastic overlays that
go a long way toward reducing glare and mimicking
the feel of paper, making it easier to get your
thoughts into the system. WriteRight fits five popu-
lar PDAs and costs \$25 for a dozen sheets (about a
year's supply).

All you do is peel the backing off and place the



sheet on the PDA's screen. Once in place, WriteRight
smoothes out most display irregularities and nearly
eliminates reflections from overhead lights. The over-
lays also make writing on the touch screen, which can
be slippery on its own, easier and more natural. Un-
fortunately, it can obscure small icons and text—par-
ticularly in low light. And, of course, it won't help you
find the system's stylus when it gets lost.

BUG BRIEFS

PROBLEM

The parallel-port version of
Iomega's Zip drive won't work
on Windows NT systems.

SOLUTION

Download the Windows NT
Tools file from Iomega's Web
site (www.iomega.com).

PROBLEM

PosterWorks (First Looks, June
25, 1996), has trouble finding
TIFF files on your hard disk.

SOLUTION

An update disk, free to regis-
tered users, from S.H. Pierce
(617-338-2222; fax, 617-338-
2223) fixes both this problem
and the program's inability to
print .EPS files.

SECOND LOOKS MAILBOX: Tell Second
Looks about your experiences with com-
puter products. Contact Brian Nadel
via MCI Mail (556-1500), CompuServe
(72241,1616), or the Internet ([bnadel
@zd.com](mailto:bnadel@zd.com)).

**UNFORTUNATELY, NOT
EVERYONE KNOWS ABOUT
OUR LIGHTWEIGHT
MULTIMEDIA PROJECTOR.**



Let's face it. Most LCD multimedia projectors need to lighten up.

Maybe they should take a clue from the EzPro™ 500 from CTX. At just 9.25 pounds, it's about half the weight of other multimedia projectors. And its trim profile and compact carrying case make it easy to take your show on the road.

Yet for all its lightness, the EzPro 500 produces extremely bright, crisp images. You get 16.7 million dazzling colors and 640 x 480 resolution. And it's just as easy to



set up and use as it is to move—whether you're plugging in to a PC, Mac, or standard video.

Lighter. Brighter. Easier. It's not hard to see why the EzPro 500 beats other multimedia projectors hands down. For more details or a hands-on demonstration, just call 1-800-433-5590.

CTX

Commitment To Excellence.

EzPro is a trademark of CTX Opto, Inc. All other trademarks are the property of their respective owners. ©1996 CTX International Inc. All rights reserved.

CIRCLE 329 ON READER SERVICE CARD

New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Melissa J. Perenson

Barrier-Breaking Ascentia

IT'S ALMOST A FORGONE CONCLUSION THAT IF YOU WANT an active-matrix display on a notebook, you're going to pay dearly for the privilege.

Not so with AST Research's **Ascentia J20** notebook. With prices starting at just \$1,799, the Ascentia J20 gives you a little bit of everything at a reasonable price. A basic configuration of the notebook comes standard with a 100-MHz Pentium processor, 8MB of RAM, a removable 540MB hard disk, and an 11.3-inch SVGA active-matrix display. The Ascentia J20 also includes one Type III PC Card slot, a comfortable keyboard with integrated pointing stick, an IrDA port, 32-bit local bus video, 1MB of graphics memory, and 16-bit



Sound Blaster-compatible sound with built-in speaker and microphone. Battery power is provided by a nickel hydride battery. The notebook weighs in at 5.9 pounds.

AST Research Inc., Irvine, CA; 800-876-4278, 714-727-4141; www.ast.com. Circle 413 on reader service card.

Here's Looking At You

NOTHING HAS BEEN ABLE to replace the importance of visual communications, whether it's a still image or a moving one. Falling somewhere in between is the \$239 **Vivitar Motion Picture Phone**.



The compact, golf ball-shaped camera connects to your PC and transmits both audio and visuals through your modem over analog phone lines. The camera features a frame update rate of ten frames per second (fps), at a resolution of 160 by 120 dpi for video and 320 by 240 dpi for image capture.

Vivitar Corp., Newbury Park, CA; 805-498-7008; fax, 805-498-5086. Circle 414 on reader service card.

PHOTOGRAPHS BY THOM O'CONNOR



ALL BUSINESS:
MyInternetBusinessPage.

designing, publishing, posting, and promoting your business's Web page. Using an unimposing interface modeled after a word processor's, you can create

Web Publishing Made Easy

THE DELUGE OF GRAPHICAL, no-HTML-required Web publishing tools only underscores the growing importance attached to having one's own home page on the Web.

MySoftware Company's \$119.95 **MyInternetBusinessPage** offers an end-to-end solution for

Web pages from scratch or select from among the nearly 60 of templates and predefined forms tailored to fit specific industries. Included is a built-in graphics converter, and a library of over 1,000 Internet-ready images. In conjunction with Swift Site's Web page hosting service, a one-button publishing wizard walks you through the posting of your page.

Asymetrix is so sure that its **WebPublisher** makes it easy enough to create your Web page in ten minutes that they're offering a money-back guarantee. The \$79 WebPublisher gets your Web page off the ground by letting you choose from over 20 different, theme-based preconfigured templates, which form the basis for your page. (New templates are posted online regularly.) The wizard-like interface walks you through the steps required to complete your page—from choosing page layout to importing text, creating hyperlinks, adding graphics, and inserting Java graphics elements. When your page is complete, WebPublisher packages the page elements automatically and transfers them to your Internet service provider or Web server. **MySoftware Company**, Palo Alto, CA; 800-325-3500, 415-473-3600; www.mybusinesspage.com. Circle 411 on reader service card.

Asymetrix Corp., Bellevue, WA; 800-448-6543, 206-462-0501; www.asymetrix.com. Circle 412 on reader service card.

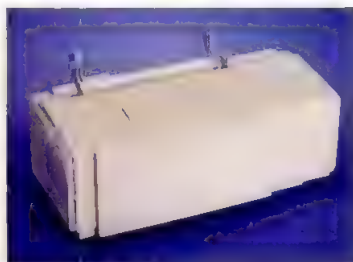
HOT PROSPECT

Unbeatable Colors

The reason for getting an ink jet printer is, well, color. And if you're after photo-realistic colors, look no further than the **Epson Stylus Color 500**.

Priced at just \$279, the Stylus Color 500's output rivals that of high-end, and higher-priced, ink jets. The printer features 720-by-720-dot-per-inch resolution—the industry's highest—and uses Epson's four-color (CMYK) piezoelectric printing technology, which uses precise amounts of pressure to ensure that ink is accurately placed on the page. The use of this print technology means that the Stylus Color 500 can use Epson's Super Penetrating inks for improved print quality, water resistance, and drying times across a variety of media.

The printer is rated at 4 pages per minute (ppm) for text, and 1 ppm for color printing. 56K of RAM comes standard. The print driver includes options for halftoning, automatic compensation for printing from digital and video cameras, and optimization for producing photo-quality output. An array of media is supported, including legal-size paper, envelopes, transparencies, and continuous paper for banners and iron-on T-shirts transfers.



Epson America Inc., Torrance, CA; 800-463-7766; 310-782-0770; www.epson.com. Circle 410 on reader service card.

The Cash Machine, Anywhere

IF YOUR ATM CARD IS YOUR LIFELINE TO YOUR BANK ACCOUNT, thanks to **Visa/Plus GlobaLocator** you'll always know exactly where you can use your Visa or Plus System ATM card.



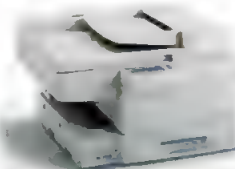
GlobaLocator, which is available on the Visa Expo Web page at www.visa.com, provides a database complete with maps of domestic and international ATM locations. Based on your search criteria—which can include the address, city, or even cross-street—GlobaLocator will locate the three closest Visa/Plus ATM machines and provide the address, hours, a map, and other pertinent information.

Visa International ATM Network, San Francisco, CA; 415-432-3200; www.visa.com. Circle 415 on reader service card.

Multipurpose Printer

MITA COPYSTAR SEEKS TO address the needs of the work-group multifunction market with the **Mita AF-1200** laser system.

The \$4,395 device, which can hook up to your PC's parallel port, pulls multiple duty as a 14.4-Kbps laser fax machine, a copier that runs at 12 pages per minute (ppm), and a 400-dpi, 12-ppm laser printer. The unit has 1MB of fax



memory, 2MB of printer memory standard, and features PCL5e emulation and 46 installed fonts.

The \$595 parallel port option lets you turn the unit into a 12-ppm laser printer and digital copier. There's a 50-sheet automatic document feeder which will accommodate letter-, legal- and ledger-size originals, and an 11- by 17-inch flatbed surface for inputting books and 3-D objects.

Mita Copystar America Inc., Fairfield, NJ; 800-222-6482, 201-808-8444; fax, 201-882-4421. Circle 416 on reader service card.



Troubleshooter

FIGURING OUT WHAT'S wrong with Microsoft Windows 95 is only half the battle. The other half includes equal parts of system optimization and preventive maintenance.

Quarterdeck's \$50 **WINProbe 95** takes all of the above into con-

sideration by offering a set of tools that help keep your system running at its best. WinProbe provides a safe way to edit the Windows registry and utilities to recover lost and fragmented resources and memory. You can also perform a hardware diagnostic and enable the CrashShield to protect your open document files from system crashes.

Quarterdeck Corp., Marina del Rey, CA; 800-354-3222, 310-309-3700; www.quarterdeck.com. Circle 418 on reader service card.

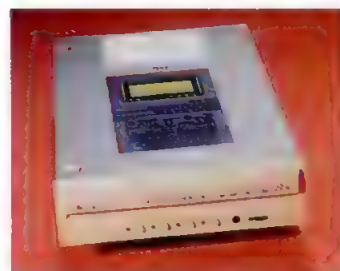
Next Generation CD Changers

WITH SO MANY CD-ROM products consisting of multiple disks, a CD-ROM changer is an attractive option.

Nakamichi's \$550 **MJ-4.8s** is the first 8X internal CD-ROM changer; the drive features a speedy data transfer rate of 1.2 Mbps. It's also the first CD-ROM changer to utilize a SCSI interface. A nice convenience is that the unit may be used in either the horizontal or vertical position, thanks to its proprietary, soft-touch mechanism based on Nakamichi's patented audio CD-changer technology. Average disk access time is 150 milliseconds.

Panasonic offering sacrifices speed for the ability to squeeze one more disc into the same space. The \$200 **Big 5 CD-ROM** is an internal, IDE quad-speed CD-ROM drive. The drive has a 200-millisecond disk-access time.

Nakamichi America Corp., Torrance, CA; 310-538-8150; fax, 310-324-7614; www.nakamichidrom.com. Circle 423 on reader service card. **Panasonic Communications & Systems Co.**, Secaucus, NJ; 800-742-8086, 201-348-7000; www.panasonic.com. Circle 424 on reader service card.



BRIEFS

Books

Why do we get so excited about new computer technology? In **Moths to the Flame: The Seductions of Computer Technology**, Gregory J.E. Rawlins sets out to answer that question and examine how computers influence all aspects of society (\$22.50, MIT Press, 800-358-0343)..... If you're still wondering what work-group software is and what it can do for your company, check out David S. Marshak's **Mission-Critical Lotus Notes**. It's a gentle introduction to Lotus Notes and how it can benefit your organization (\$29.95, Prentice Hall, 800-947-

7700)..... Thanks to such media as CD-ROMs and the Web, computers have become an art as well as a science. **Multimedia Graphics: The Best of Global Hyperdesign** is an elegant book that celebrates the best of computer design (\$49.95, Chronicle Books, 800-722-6857).

Internet

Now you can use the Internet to send faxes anywhere in the world. Specom Technologies' \$59.50 **Internet Color Fax** lets you send grayscale and color faxes from your scanner or Microsoft Windows applications, or from their

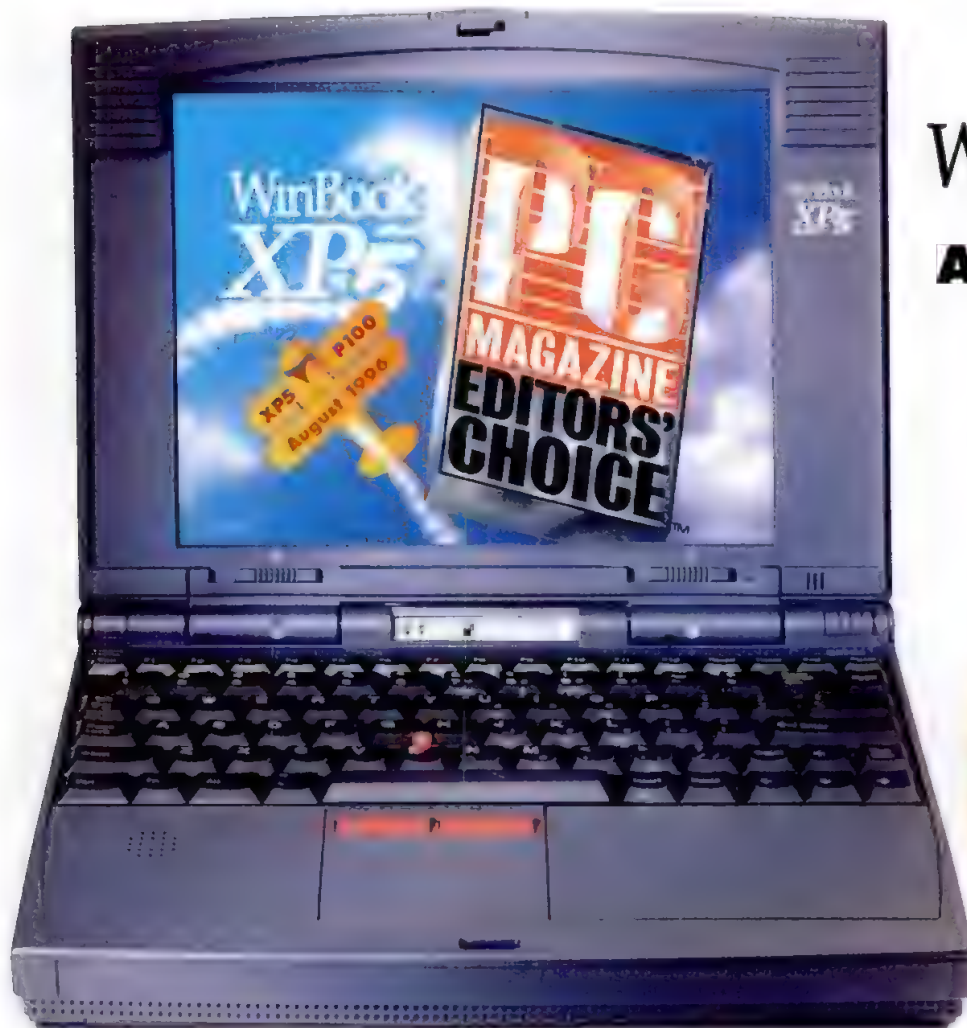
own fax editors. The receiving side must be appropriately equipped in order to print out your faxes in color (www.specom.com)..... Similarly, FaxSav Software's **FaxSav** for Internet (starts at \$15 per month) includes modules for easily sending faxes from your Windows software, any Twain-compliant scanner, and your Internet e-mail account (www.faxsav.com)..... Tired of downloading Web software? Andover Advanced Technologies' \$50 **Web7** CD-ROM includes full versions of seven popular Internet programs, including HotDog and CyberPilot Pro (508-835-5300).

#1 BEST BUY AND EDITORS' CHOICE!

PC Magazine, EDITORS' CHOICE "...combines high-end components and solid performance with reasonable prices..." — August 1996



PC World Magazine
#1 BEST BUY: POWER SYSTEMS
"Great price, performance, features."
— June 1996



WinBook *XP5*

ACTIVE MATRIX

**100MHz PENTIUM®
PROCESSOR**

810MB HARD DRIVE

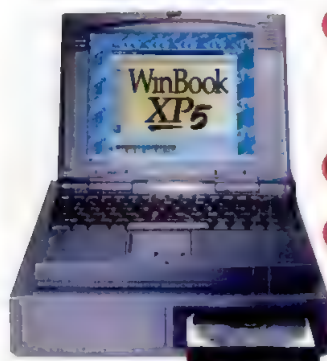
14.4 FAX/MODEM

8MB RAM

NIMH BATTERY

\$1999
**ACTIVE
MATRIX**

MAKE YOUR XP5 MULTIMEDIA READY WITH THE 8X CD-ROM DOCKING STATION



8X CD ROM
Standard
with the XP5
Docking
Station

**Expansion
Bay
and
Two
Expansion
Slots**
for only
\$399

\$2399 XP5 100MHZ

- 100MHZ INTEL® PENTIUM® PROCESSOR, POWER SAVING NOTEBOOK CHIP
- 16MB RAM
- 810MB REMOVABLE HARD DRIVE
- 14.4 SEND/RECEIVE FAX/DATA MODEM
- 10.4" TFT ACTIVE MATRIX COLOR DISPLAY
- 40 WATT LITHIUM ION BATTERY WITH POWER MANAGEMENT
- EXTENDABLE 1-YEAR LIMITED WARRANTY

Add stereo sound to your WinBook XP5 for only \$79.95

\$2999 XP5 133MHZ

- 133MHZ INTEL® PENTIUM® PROCESSOR, POWER SAVING NOTEBOOK CHIP
- 16MB RAM
- 1.3GB REMOVABLE HARD DRIVE
- 28.8 PCMCIA FAX/MODEM
- 10.4" TFT ACTIVE MATRIX COLOR DISPLAY
- 40 WATT LITHIUM ION BATTERY WITH POWER MANAGEMENT
- EXTENDABLE 1-YEAR LIMITED WARRANTY

Add a dual-button touchpad for only \$79.95

XP5 STANDARD FEATURES

- 256K L2 CACHE
- 1MB VIDEO RAM
- 3.5" 1.44MB DISKETTE DRIVE
- 6.1 LBS
- 32-BIT LOCAL BUS VIDEO
- TWO TYPE II OR ONE TYPE III PCMCIA SLOT
- INTEGRATED DUAL-BUTTON POINTING STICK, OPTIONAL DUAL BUTTON TRACKBALL OR TOUCHPAD
- PARALLEL, SERIAL, AND PS/2 PORTS

1-800-468-7510

Monday-Friday, 8am-9pm EST • Saturday, 9am-4pm

Use your WinBook Credit Card, VISA, Discover Card, MasterCard, personal check or P.O. with credit approval. U.S. sales only. 30-day unconditional money-back guarantee from date of purchase.

WinBook
COMPUTER CORPORATION
a subsidiary of Micro Electronics, Inc.

©1996 WinBook Corporation. All rights reserved. WinBook is a registered trademark of Micro Electronics, Inc. The Intel Inside logo and Pentium are registered trademarks of the Intel Corporation. All other trademarks and registered trademarks are property of their respective corporations. All prices and specifications are subject to change without notice or obligation. Prices do not include shipping.

CIRCLE 085 ON READER SERVICE CARD

Designed for



Microsoft
Windows 95



pentium
PROCESSOR

Best Pentium processor-based PC at entry-level price.

- Intel 75 or 100 MHz Pentium processor
- 8-16MB RAM, expandable to 128MB
- EDO RAM
- Optional 256KB cache
- 640MB** high-performance Enhanced-IDE hard drive
- PCI integrated graphics accelerator and 1MB DRAM standard, upgradable to 2MB
- Flash BIOS for easy upgrade
- Designed for Windows® 95
- Preloaded HP DMI Desktop Management Interface
- Free three-year limited warranty for parts and labor¹

from **\$1,262***



HP Vectra VE

Best managed PC.

- Intel 75, 100, 120, 133, 150 or 166 MHz Pentium processor
- LAN Remote Power
- PCI integrated 32-bit 10Base-T Ethernet interface
- Network certified and preconfigured for Microsoft® and Novell clients
- Preloaded HP DMI Desktop Management Interface
- Vectra Op-Center
- Norton Smart Disk Doctor
- Parallel transfer driver preinstalled for faster LAN packet processing
- Advanced security meeting C2 level
- 64-bit graphics accelerator on PCI bus
- 1MB video RAM, expandable to 2MB
- 8 or 16MB EDO RAM, expandable to 128MB
- 840 or 1280MB Enhanced-IDE hard drive
- 4 mass storage shelves (3 front accessible), 4 expansion slots
- Two 32-bit PCI slots
- Flash BIOS for easy upgrade
- Designed for Windows 95
- Free three-year limited warranty for parts and labor¹

from **\$1,513***



HP Vectra XM

Leading Pentium processor/PCI performance at an affordable price.

- Intel 100, 120, 133, 150 or 166 MHz Pentium processor
- Desktop and minitower packages
- 256KB burst synchronous cache
- 8-16MB RAM, expandable to 128MB
- EDO RAM
- PCI/ISA architecture
- 640MB** high-performance Enhanced-IDE hard drive
- PCI integrated graphics accelerator and 1MB DRAM standard, upgradable to 2MB or Matrox Millennium PCI graphics card with 3D acceleration and 2MB WRAM, upgradable to 8MB
- Flash BIOS for easy upgrade
- Full plug-and-play capability
- Designed for Windows 95
- Preloaded HP DMI Desktop Management Interface
- Free three-year limited warranty for parts and labor¹

from **\$1,415***



HP Vectra VL



In Canada, call 1-800-387-3867. Average U.S. street price. Monitor not included. Other capacities available. HP Vectra PCs come with MS-DOS 6.2 and MS Windows for Workgroups 3.11, or Windows 95, OS/2 or Windows NT included. First year, on-site, 24-hour, next-day service. Second and third year, return to dealer. Microsoft, MS-DOS, Windows and Windows NT are U.S. registered trademarks of Microsoft Corporation. Pentium and the Intel Inside logo are registered trademarks of Intel Corporation. OS/2 is a registered trademark of the International Business Machines Corporation. ©1996 Hewlett-Packard Company. PPG430

**Exceptional performance
and expandability at an
affordable price.**

The ultimate PC.

- Intel Pentium Pro 150, 180 or 200 MHz processor with 256KB integrated cache
- Supports dual processing with secondary Pentium Pro socket
- 128-bit high-performance memory architecture
- 16-32MB ECC DIMM memory standard, expandable to 256MB with 8 DIMM memory expansion slots
- PCI integrated Ultra SCSI Fast 20 interface with 20MB/s throughput
- 1,000MB** SCSI-2 high-performance hard drive
- PCI Matrox Millennium graphics card with 3D acceleration and 2MB WRAM, upgradable to 4MB or 8MB
- 7 mass storage shelves (5 front accessible)
- 6 expansion slots: 3 PCI, 1 PCI/ISA combo and 2 ISA
- 10Base-T/100VG AnyLAN selectable PCI NIC with up to 100 Mb/s throughput
- Integrated 16-bit audio and 4X CD-ROM
- Microsoft Windows NT® 3.51
- Free three-year limited warranty for parts and labor†

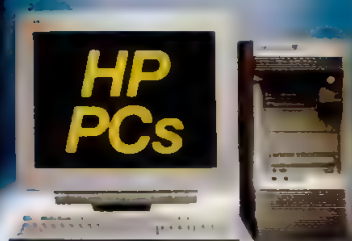
from **\$3,939***



HP Vectra XU

- Intel Pentium Pro 150 MHz processor with 256KB integrated cache
- 128-bit high-performance memory architecture
- 16MB DIMM memory standard, expandable to 256MB with 8 DIMM memory expansion sockets
- 1,000MB** Enhanced-IDE hard drive
- PCI Matrox Millennium graphics card with 3D acceleration and 2MB WRAM, upgradable to 4MB or 8MB
- 7 mass storage shelves (5 front accessible)
- 6 expansion slots: 3 PCI, 1 PCI/ISA combo and 2 ISA
- Integrated 16-bit audio and 4X CD-ROM
- Microsoft Windows NT 3.51 or IBM OS/2® Warp
- Free three-year limited warranty for parts and labor†

from **\$2,615***



HP Vectra VT

Helpful hint:
Rip out and pin up next to
Compaq and IBM ads.

A little comparison shopping will quickly show you that HP puts the best prices on the most impressive PCs. One standout is the network-ready Vectra XM. It's configured for the most demanding networks with LAN Remote Power, Super-fast LAN install and HP Vectra Op-Center for more effective remote management. Every Vectra will outshine the competition when it comes to features and price. From the Pentium® processor-based PCs to the dual Pentium Pro processor-based HP Vectra XU PC. For more information or the name of your nearest HP reseller, call 1-800-322-HPPC, Ext. 1703. Or visit us at <http://www.hp.com/go/vectra>.

Projectors with Flair

GIVING PRESENTATIONS JUST GOT EASIER THANKS TO NEW high-end—and high contrast—LCD projectors.

For high-contrast displays, look at ASK LCD's \$10,495 **Impression 860**. The active-matrix LCD projector features a screen-refresh rate of 30 times per second (equivalent to a broadcast quality of 30 frames per second) and has high-contrast, SVGA 800- by 600-pixel resolution—sufficient to project any computer-based image or presentation into a well-lit room. The unit can display resolutions of up to 1,152-by-870. ASK LCD's infrared remote mouse is bundled with the projector.



BRIGHT LIGHT: ASK LCD's *Impression 860* projector.

Proxima's \$16,995 **Desktop Projector 9100**, a compact, active-matrix projector designed for travel. It supports resolutions from 640 by 480 to 1,280 by 1,024. The \$1,995 MediaExpress presentation system is the first stand-alone device to incorporate Adobe Acrobat Player, allowing you to save presentations to a floppy disk and then view them at XGA resolution. **ASK LCD Inc.**, Lyndhurst, NJ; 800-275-5231, 201-896-8888; fax, 201-896-0012. *Circle 420 on reader service card.*

Proxima Corp., San Diego, CA; 800-447-7692, 619-457-5500; www.prxm.com. *Circle 421 on reader service card.*

Organizer Plus

SO MANY SCANNED DOCUMENTS, so little time to manage them. That's a problem NewSoft's **Presto! PageManager Suite** intends to remedy.

The \$199 Twain-compatible suite features seven useful applications that help you to manage your scanned images and documents. Included in the package are a drag-and-drop document manager and an electronic filing

cabinet with fuzzy search capabilities.

The suite also has separate software modules for: Performing optical character recognition, filling out scanned forms electronically, managing your scanned business cards, completing basic image editing, and transmitting color images via a fax modem.

NewSoft Inc., Fremont, CA; 800-214-7059, 510-252-0267; www.tophat.com. *Circle 422 on reader service card.*

The Marketer

MARKETPLACE INFORMATION Corp.'s **D&B Marketplace, Version 3.0** proves is a powerful tool for conducting business-to-business direct marketing and analysis.

This quarterly CD-ROM features a robust database of more than ten million records representing businesses nationwide. Working on a credit system, you

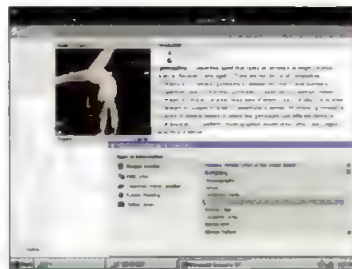
pay for the data you unlock; each record includes the business's name, address, Standard Industrial Code (SIC), size, revenue, and other information. You can generate random samples, and cross-tab and multiple-variable analyses. The \$599 price includes \$300 worth of data.

MarketPlace Information Corp., Waltham, MA; 800-590-0065, 617-672-9200; www.mktplace.com/home. *Circle 419 on reader service card.*

Encyclopedias Take to the Web

THE CD-ROM ENCYCLOPEDIA EXPANDS TO A MULTIVOLUME set with Microsoft's \$79.95 **Encarta 97 Encyclopedia Deluxe Edition**.

Microsoft circumvents the problem of swapping two CD-ROMs by packing the full-text of articles on both disks, thus giving you access to all articles regardless of which disk you're using; you may, however, have to switch disks to view multimedia elements. Encarta 97 now includes over 5,000 links to Web pages associated with the encyclopedia articles. The disk features 3,000 new articles, and over 31,000 articles in all.



WEB LINKS: Microsoft *Encarta 97*.

Also taking advantage of the Web is the \$50 **1997 Grolier Multimedia Encyclopedia** from Grolier Interactive. In addition to an improved interface, Grolier's includes over 50,000 encyclopedia entries, a world atlas, and links to thousands of Web sites through the Grolier Internet Index. Over 50 hours of free Internet access is provided via the bundled AT&T WorldNet Service.

Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com. *Circle 425 on reader service card.*

Grolier Interactive, Danbury, CT; 800-336-3686, 203-797-3530; www.grolier.com. *Circle 430 on reader service card.*

BRIEFS

Software

It may be a Windows world, but DacEasy hasn't forgotten its DOS users. DacEasy **AccountingSeries Version** is available for DOS, with accounting, payroll, point-of-sale, order-entry, and job manager modules. Prices range from \$249.95 to \$399.95. (800-322-3279) If clip-art selection is what you want, that's what you'll get with T/Maker Co.'s \$60 **The ClickArt Incredible Image Pack 65,000** CD-ROM (415-962-0195) CyberMedia is offering its popular **First Aid 95 Deluxe** PC diagnostic and

repair product for networks. The Network Edition starts at \$320 for a 10-user license (310-581-4700).

Hardware

If two serial ports aren't enough for your burgeoning collection of peripherals, double your available serial ports with Axxon Computer Corp.'s **QuadPort jumperless serial I/O card**. The \$299 16-bit ISA/EISA bus card provides four high-speed serial ports (800-361-1913) Do you need to display your graphics work across two monitors? Artist

Graphics' **NetVision 2000I TwinView** display controller lets two side-by-side monitors operate as a single, continuous display capable of resolutions of up to 1600-by-1280 per monitor (800-627-8478) Konexx has added the \$179 **DataTalk II** to its line of telephone adapters for computer users. The DataTalk II creates an analog connection for use with DSVD modems (619-622-1400) Microcom's \$170 **WWWebPorte** includes the DeskPorte 28.8 modem and a selections of tools for use with the Internet (617-551-1000).

Lotus

Novell

Microsoft

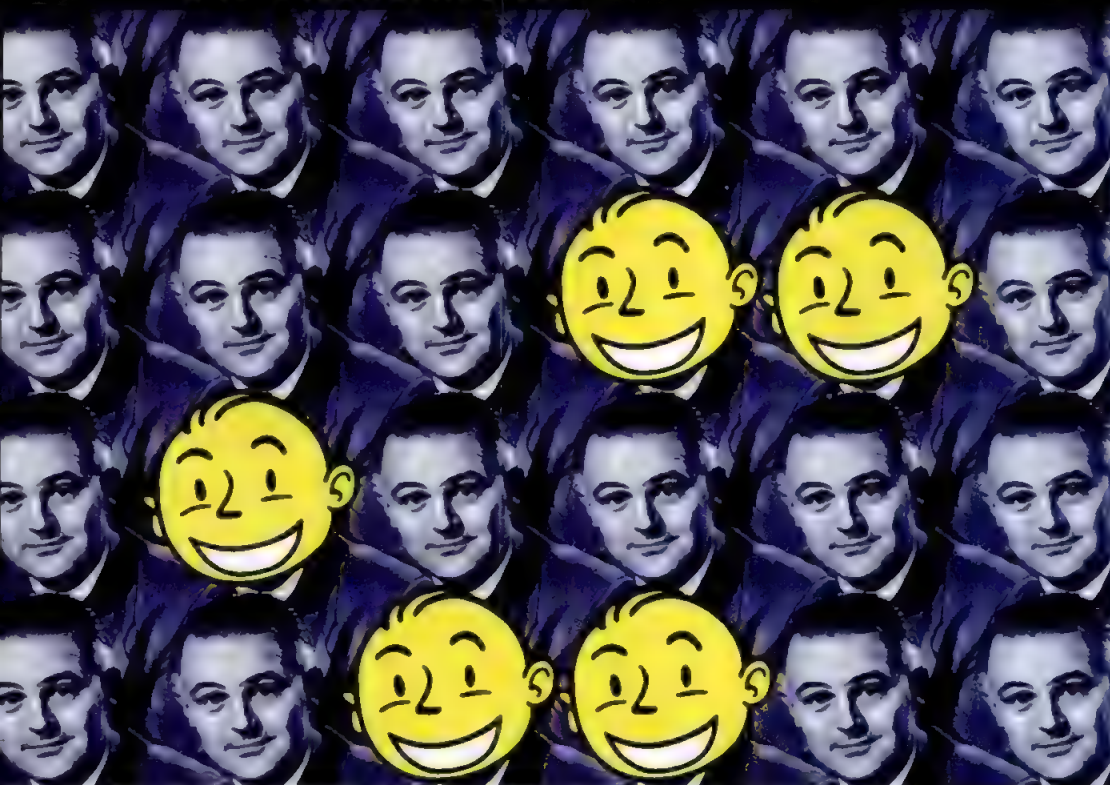
and hundreds of other software and

hardware manufacturers have opened a huge window of

o p p o r t u n i t y

1-800-
t r a i n i n g

www.1800training.com



The demand for people qualified to use high-tech products has created hundreds of thousands of new jobs. Jobs with good salaries. Advancement. Security. And we can train and certify you for one of them in a year or less. Put a smile on your face. Call, today.

1-800-training

A person is slumped over a desk, their head buried in their arms, suggesting extreme fatigue or stress. The background is a warm, golden-brown color with a textured, painterly appearance. The text is overlaid on the image in a white, serif font.

We've changed the
dreaded, backbreaking,
mind-numbing, painful
task of communicating
through your computer.

(All right, slight exaggeration.)

Introducing FocalPoint



O.K, so maybe communicating through your computer isn't something you'd consider

incredibly taxing and laborious, but it can be, shall we say, a major hassle.

all of your messages, you check a single in-box. You only need to manage one address book, as well. And you can also create a single message, address it to multiple people and the message will be sent out in the preferred



That's why Global Village, the maker of award-winning FaxWorks™ software, has introduced FocalPoint™ integrated communications software. Only FocalPoint lets you fax, transfer files, exchange e-mail, access the Internet and manage phone calls all from one window on your computer, making communicating easier than ever.

Because FocalPoint integrates all of these full-featured capabilities, you don't have to constantly switch between applications. To get

method for each person, like e-mail, fax, what have you.

FocalPoint is fully compatible with both Windows® 3.1 and Windows 95, so visit your local reseller and give it a try.

Or, call 800.436.6752 ext. 1266 for a free trial copy on CD-ROM and visit our Web site at <http://www.globalvillage.com/fp6/> for more information.

If you're not too tired.



GLOBAL VILLAGE
COMMUNICATION

Learning to **golf** on narrow fairways

was, in my mind, the key to improving my game. After all, I kicked my husband's butt on the doglegs, but I always seemed to hook wildly on the straight holes. With one search, I found [Improve Your Golf Game](#), which suggested rethinking the path of the drive. So I scrolled down my search list and took a [Private On-Line Golf Lesson](#), which profiled me as over-competitive and tense. At first I balked, but then I clicked into [Better Golf Through Hypnosis](#) and realized my type-A drive was getting me nowhere. So I signed up for a week-long Zen



golf camp at the [Golf Orgy](#) Web site. Not only did the relaxation techniques improve my swing tempo, my gynecologist believes they also

radically increased my fertility.

Picture and sound searches. City Guide. Bonus rewards. This is no Web index.

This is the ad you need Lycos at www.lycos.com. Lycos. Where will **Go Get It** get you?

To click our GO GET IT button, you don't need a membership or a professional keystroke

The End of Common Experience

We don't sit out on the front stoop any more. We don't watch the first 15 minutes of Carson before we hit the sack so we can laugh together at work the next day. We don't all watch the Ed Sullivan show on Sunday night. Our local newspaper is beleaguered

by the pressures of steadily decreasing readership, higher costs, and less advertising.

We don't even work in the office any more. Between telecommuting, time on the road, and staying in hotels, the once-reliable office routine is a vanishing reality for more and more Americans. Dozens of other common experiences have disappeared from our lives, but I'll focus on the changes driven by technology.

The advent of 50 or more channels on cable has completely stratified our television viewing experience. Our community is defined as never before by our age and our interests, not by our physical location. The evening newspaper is extinct, and the televised evening news may be on the endangered list, supplanted by all-news channels. As people begin to turn to the Internet for news or to future sophisticated hybrids of television and the Internet, the advent of personal pages and customized views makes any commonality of experience even less likely.

Even wide usage of a Web page is no guarantee of common experience. Database publishing, user profiles, and sophisticated programming can make each user's view of the page unique. For that matter, you can participate in Usenet groups with a "twit" filter turned on that blocks messages from the more vitriolic writers. Imagine, perhaps, that one of your friends then sends you an e-mail commenting on the flame war in a newsgroup you've both been reading. Your reaction: Flame war? What flame war? It's akin to not noticing a flying saucer landing in the local park because you've turned up your Walkman and tuned out everything else.

The good news is that people with specific interests can find lots of similar-minded people with whom to interact. The bad news is that people whose behavior already tends toward the antisocial will likely find increased support for their tendencies, unmoderated by interaction with the rest of the world. I worry about the changes and dislocations this will cause in the workplace and in society at large. Every person who drops out of the sphere of common experience drops into specialized, highly defined virtual com-

munities. I fear that this will increase intolerance, bigotry, and even criminal behavior.

So if you want to join the burgeoning legions of Brooke Shields fans online, enjoy. No one will quarrel with that right, although some might question your taste in actresses. By sharp contrast, pedophiles, racists, and others who tend to live outside the larger societal feedback loop will find it far easier to keep doing so. Will this cause these deviants to believe that their behavior is acceptable in society, because it's acceptable in a microcosmic group? Note that this has nothing to do with the Communications Decency Act and other overreactions to the newness, strangeness, and ubiquitousness of the Web. We have laws against obscenity and pornography, and they balance nicely with the First Amendment.

But throughout history, the human race has not exactly covered itself in glory with its record for tolerance and understanding. Not only is there the potential for the weird to get weirder but for the supposedly normal among us to become less tolerant, because we have less exposure to those who are different. We may have lots of natural walls in our society, but they're also rather permeable. We achieve a degree of normalization through the leakage.

Does the age of electronically customized communication spell the end of communities as we know them, or is it merely a redefinition? The end of something is always the beginning of something else. The future belongs to those who can discern

what the new thing is and when it has reached critical mass. If the way we form communities changes, will it necessitate changes in the way we organize our society? I'm no fan of electronic voting and simple majority rule. Representative government, despite all its historical and current abuses, succeeds pretty well at preventing change from happening at too rapid a pace.

Then, too, the pendulum is always swinging, and it often goes too far before reversing course. If we in fact fragment ourselves by going too far into our walled cities of self-interest, it may prompt a deep, widespread craving for common experience once again. □



I'M WORRIED

There's potential for the weird to get weirder and for the normal to become less tolerant.



WHEN THE JOB CALLS FOR A PRO, WE HAVE YOU COVERED.

Now there's a system that's flexible and sensibly priced for your office or department—the **ClientPro™** from Micron Electronics. Designed for long life and reliable, affordable performance, this new PC offers years of productive and adaptable computing without costly system upgrades. And now we are matching the hardware power and reliability of the Pentium® processor with powerful system software by introducing the new 32-bit operating system everyone is talking about—Microsoft® Windows NT Workstation®. With the ClientPro PC, you get a system custom configured to fit your office needs, network ready with Windows NT Workstation and backed by our industry-leading Micron PowerSM warranty.



ClientPro™ P120

- Intel 120MHz Pentium® processor
- 256KB pipeline burst cache, flash BIOS
- 3Com® 3C509 Combo network adapter
- 3.5" floppy drive
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- MS-DOS® 6.22/Windows® for Workgroups 3.11
- ✦ 5-year/3-year Micron PowerSM warranty

- PCI 64-bit graphics accelerator (2MB EDO) • 8MB EDO RAM
- 1.2GB EIDE hard drive • 14" Micron 14FGx, .28dp (12.9" display)
- Microsoft Works preinstalled

\$1,499
Bus. lease \$51/mo.

- PCI 64-bit graphics accelerator (2MB EDO) • 16MB EDO RAM
- 2.1GB EIDE hard drive • 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Works preinstalled

\$1,819
Bus. lease \$62/mo.

- With 133MHz Pentium processor add \$50



ClientPro™ P200

- Intel 200MHz Pentium processor
- 256KB pipeline burst cache, flash BIOS
- 3Com 3C509 Combo network adapter
- 32MB EDO RAM
- 3.1GB EIDE hard drive
- 3.5" floppy drive
- 8X EIDE CD-ROM drive
- PCI 64-bit graphics accelerator (2MB EDO)
- 17" Micron 17FGx, .26dp (15.8" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT™ Workstation
- Microsoft Office Pro 95 & Bookshelf® 95 CDs
- ✦ 5-year/3-year Micron Power warranty

\$3,207
Bus. lease \$109/mo.

CIRCLE 119 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

International Sales
208-893-8970

International Fax
208-893-7393

Tollfree from Puerto Rico
800-708-1756

Tollfree from Canada
800-708-1758

Tollfree from Mexico
95-800-708-1755

MICRON™
ELECTRONICS, INC.

800-295-0546

<http://www.mei.micron.com>

©1998 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice; prices do not include shipping and handling. 30-day money-back policy does not include return freight and engine reshipping charges, applies only to Micron brand products and varies from case of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Lease prices based on 36-month lease. Intel, Intel Inside and Pentium are registered trademarks of the Intel Corporation. Microsoft, Windows and the Windows logo are registered trademarks and Windows NT is a trademark of Microsoft Corporation. All other service marks, trademarks and registered trademarks are the property of their respective companies. MLEPHO-PCMG-06108

Warranty & Support

- Available limited warranty on microprocessor and main memory
- 3-year limited parts/warranty system warranty
- 1-2-year linear optional on-site service agreement for Micron desktop systems
- 30-days of free Micron supplied software support for Micron desktop systems
- 30-day money back policy
- 24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranty and terms and conditions of sale. Terms and conditions of sale vary by specific configurations. *Applies to the limited warranty only. May be obtained at our Web site: www.micron.com

900 E. Ketchikan Blvd., Ketchikan, AK 99901 • 800-295-0546 • Fax 907-453-3434 • International Sales Office: New York Area: 208-893-3434 • Fax 208-893-3434 • Purchase Order Fax 208-893-8992 • Technical Support Available 24 Hours A Day • 7 Days A Week • Technical Support E-mail: tech.support@mei.micron.com

The Digital-TV Disaster

The U.S. Government is on the verge of selling the public down the river to Japanese TV manufacturers—starting with Sony—regarding digital television standards. The situation has gotten so bad, a consortium of computer companies has been trying to

stop the approval of a ludicrous standard that would bring to the market a stupid technology—fallout from the expensive high-definition TV (HDTV) debacle of a few years back. If all goes according to plan, the American consumer will pay the bill for the mistakes made by overseas TV makers. Your tax dollars at work.

Because there is no serious effort to keep tabs on government idiocy, the computer industry found out about this digital-TV fiasco at the last minute. Apple, Compaq, Microsoft, and seven other companies formed the Computer Industry Coalition for Advanced Television Service (CICATS). They were soon joined by the American Society of Cinematographers and the Directors Guild of America. This coalition is countering the moronic proposals drafted by the Advisory Committee for Advanced Digital Television Service (ACATS).

For years, the lone voice of Apple has been trying to bend the FCC's ear regarding digital TV. But it seems the FCC is more sympathetic to Sony and other foreign TV makers—they must be better lunch partners. And oh yes, the Luddite American TV broadcasters who hate digital are going along with this nevertheless, for other reasons. The new digital TV standard was about to be approved when Bill Gates and Steven Spielberg went to Washington to get the process stopped long enough for CICATS to file some papers outlining everything wrong with it.

Here's the crux of what ACATS is proposing: First of all, the standard would consist of 18 different formats—all odd standards, resolutions, and frame rates. The reason for this many formats is so each money-wasting HDTV expense can somehow be recouped by incorporating every bad idea at once. Of all the different formats, not one feature would be computer-compatible, and the highest resolution (out of four possible resolutions) is interlaced *only*. In fact, the whole standard seems oriented toward archaic interlace technology. There are two screen ratios: 4:3 and the wacky 16:9, which doesn't really match anything Hollywood is doing. But the overseas TV makers have already invested millions in 16:9 and they

expect the FCC to kowtow to them. The rates for this standard can be 24, 30, or 60 frames per second, with some variation—but none match the typical 72-Hz computer monitor rates. Also, the idea of standard pixel ratios, such as 640-by-480 or 1,024-by-768 or even any fixed ratio, is not part of the ACATS standard. Instead, the analog concept of vertical-resolution lines is maintained, which makes no sense at all. The idea of pixel addressing is lost on these folks. (Microsoft Graphics Fellow Alvy Ray Smith has a Web page that links to most of the documents regarding this, at www.research.microsoft.com/research/graphics/alvy.)

So here we have the world's most vibrant computer industry and instead of using it—if for no other reason than because it simply has better technology—the U.S. government is set to adopt bonehead Japanese standards of which even the Japanese are not particularly fond.

This kind of craziness is allowed to occur because the computer industry does not represent itself well in Washington. An FCC commissioner told me it was laughable that a company like Microsoft would brag about its lone registered lobbyist. An RBOC the size of Microsoft might have 100 to 200 people in Washington schmoozing, chatting, making friends. This is just the way it works. Grow up, folks.

What's particularly weird is how Microsoft never even thought to use its hundreds of PR people to get the word out. This issue has had zero coverage except for a single article in *Barron's*, by Jim McTague,

one of the last writers to still do his own research. Gates has been to Washington and executives such as Craig Mundie have been before Senate committees discussing digital TV. Still, little ink. Recently, the *PC Magazine* editorial staff spent a day at Microsoft, but this important issue was never mentioned. What kind of thinking is that?

Just like when the Communications Decency Act was passed, look for a lot of whining after this turkey of a standard gets approved. Maybe someday our industry will learn how to play like the big boys. In the meantime, the public suffers.



TUNED OUT

This craziness occurs because the computer industry does not represent itself well in Washington.

New ATX Products! New Price Reductions!

Bullet-Proof Upgrades.

POWER SUPPLIES

"The premier power-supply maker"

John Dvorak, *PC Magazine*, March 30, 1993

"The only company to go to for a power supply"

Jerry Pournelle, *Byte*, April 1993

ECONOMICAL

Save on quality UL/CSA approved power supplies!

STANDARD 230 SLIM \$59

STANDARD 230 DESK or TOWER \$79

STANDARD 250 ATX **NEW!** \$89

ULTRA-QUIET



Toss the earmuffs! The best way to get relief from a noisy computer is with a **Silencer®** power supply. Its high-efficiency fan reduces noise up to 90%! A *multimedia* must.

SILENCER 230 SLIM \$69

SILENCER 270 SLIM \$129

SILENCER 270 DESK or TOWER \$139

HIGH-PERFORMANCE



For power that won't skip a beat during hard drive access or line voltage sags, upgrade your PC with a premium **Turbo-Cool®** power supply. You'll get 50%-100% more power, built-in line conditioning, super-tight regulation, ultra-clean output, enhanced cooling, UL/CSA/TUV, and 3-5 year warranty! Why run a high-end system with anything less?

TURBO-COOL 200 SLIM \$79

TURBO-COOL 300 SLIM \$129

TURBO-COOL 300 DESK or TOWER .. \$139

TURBO-COOL 400 SLIM or TOWER ... \$199

TURBO-COOL 400 ATX **NEW!** \$229

TURBO-COOL 450 TOWER \$319

TURBO-COOL 450 GOLIATH **NEW!** \$419

ENCLOSURES

ECONOMICAL



For a clean, easy-to-build system, get the **Personal Mini-Tower** enclosure. Features: (3) 5-1/4" bays, (4) 3-1/2" bays (2 int.), and a slide in/out motherboard cage.

PERSONAL MINI-TOWER \$69

PERSONAL MINI-TOWER ATX **NEW!** \$89

PROFESSIONAL SERIES



For a great-looking, heavy-duty, **American-made** enclosure, choose from our **Solid-Steel** family!

	Mini	Tower	Monster
Total Bays (Exposed Bays):	6(4)	10(8)	18(13)
MB and P.S. Capacity:	1	1	2

SOLID-STEEL MINI \$179

SOLID-STEEL TOWER \$279

SOLID-STEEL TOWER ATX **NEW!** \$299

SOLID-STEEL MONSTER \$789

REDUNDANT POWER



Get redundant 250W power, in 1 slim unit, with our economical **Two-in-One 500**.

For high-end applications (5,000,000 hr. MTBF!), choose from our *hot-swappable* **TwinPower™** series.

TWO-IN-ONE 500 **NEW!** \$249

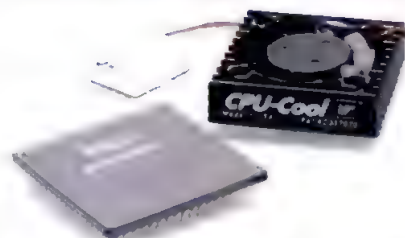
TWIN-POWER 600 \$649

TWIN-POWER 900 \$969

CIRCLE 080 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

CPU COOLERS

PENTIUM & 486



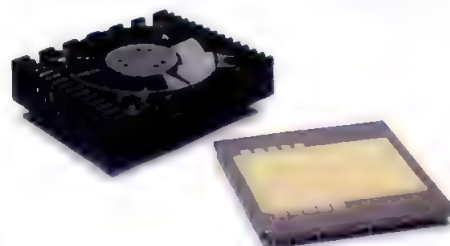
486s & Pentiums run hot, often exceeding 210°F! Cool'em by 90°-120°F with genuine, low-profile **CPU-Cool™** coolers. Each consists of a long-life, ball-bearing, mini-fan *integrated* into a patented die-cast heat sink that easily mounts on the CPU. Last 10X longer and are 40% thinner than cheap, bulky imitations! Made in USA. 5-year warranty.

CPU-COOL 1.9T (486, 75-133 P5) \$22

CPU-COOL 1.9W (150-166 P5) \$22

CPU-COOL 2.3W (200 P5) **NEW!** \$25

PENTIUM® PRO



Check the specs for the best P6 thermal solution!

	Sink/Aux. Fan	Std. Cooler	CPU-Cool 3.2
Thermal Resist:	1.5°C/W	1°C/W	0.8°C/W
3-Yr. Failure Rate:	1:100	1:10	1:1,000
Height:	1.2"	1"	0.74"

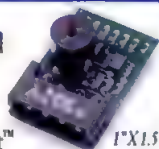
CPU-COOL 3.2 (P6) **NEW!** \$29

OVER-TEMP ALARM

Don't let a bad fan or a clogged filter cost you your system! Detect overheating, *before* damage occurs, with a **110 Alert™**

110°F heat alarm. Low-cost protection for any PC.

110 ALERT \$22



11th Year

PC POWER & COOLING, INC.

1985-1996

5995 Avenida Encinas, Carlsbad, CA 92008 • (619) 931-5700 • (800) 722-6555 • Fax (619) 931-6988

Web: <http://www.pcpowercooling.com> Hours: 7 a.m.-7 p.m. (PT) Mon.-Fri. Terms: Visa, MC, COD, or PO. Warranty: 5-ys. for CPU-Cool, and Turbo-Cool 450; 3-ys. for Turbo-Cool (except 450); 2-ys. for all others. Silencer, Turbo-Cool, TwinPower, CPU-Cool, and 110 Alert are trademarks or registered trademarks of PC Power & Cooling, Inc. Pentium is a registered trademark of Intel Corp. © 1996 PC Power & Cooling, Inc.

Inside Track

Where, Oh Where Is MMX? **Dept.:** According to Intel's initial plans, the MMX chip should be in **most of the machines being shipped**

today. Things change. The recent announcements by Intel that the chip will ship sometime in 1997 because of OEM concerns turns out to be partially true. Apparently the OEMs **screamed bloody murder** when Intel told them it would roll the MMX chip into the market before the end of the year with **no clear transition strategy** in place. The fear is that once MMX shows up, nobody will even look at a common Pentium, and the big boys—Compaq, Dell, and Gateway—will be stuck with boatloads of machines they won't be able to sell. This inventory problem could **actually destroy** some of the smaller computer vendors. There is only one solution to this potential crisis: slipstream **temporarily crippled machines** into the market.

It works like this: Intel makes MMX chips and sells them with the **MMX circuit disabled** so the chip appears to be a standard Pentium. Sales of these seemingly normal Pentiums continue until the pipeline is filled, all of the original Pentiums are out of inventory, and the big boys are selling only MMX Pentiums—which **appear** to be old Pentiums. The MMX will then be rolled out officially. Everyone who just bought a Pentium will discover that they've got no cause to complain, because voilà! A flash-memory BIOS upgrade turns on the MMX circuit. And all the machines in inventory are suddenly MMX. **No fire sale.**

This maneuver is not unprecedented. Over the last few years, many machines have been shipped with high-speed serial and parallel ports that **look and act like old ports.** A little software gets thrown at them, and suddenly they speed up. These port upgrades were all **slipstreamed** into the market. Similarly, I suspect that shipping software with two code bases—the second being slipstreamed into the market **for automatic upgrades**—would also be a great way to control software inventory during a version change.

But today's users need extraordinary handholding, as demonstrated by the **slow switch from 28.8-Kbps to 33.6-Kbps modems—even though it's free.** Most V.34 modems are **field-upgradable** to 33.6 with a **software patch.** But few users have bothered to make the change, despite knowing that overall performance is improved at all speeds. Contact your modem maker and ask if your modem is field-upgradable.

And finally, all of this may be academic, if the problem with getting MMX out to the market is really the result of a more common semiconductor bugbear: **yield problems.** By the way, this makes for **good cocktail-party**

*The OEMs screamed
bloody murder when Intel
told them it would roll out
MMX this year. The fear is
that once MMX shows up,
nobody will even look at a
common Pentium—and
the big boys will be stuck
with loads of machines.*

chatter in high-tech circles. At any time during a conversation, just jump in and say, "Gee, I heard the chips were having yield problems." Suddenly, you sound like an expert.

How Do They Make Money?

Dept.: Here's a letter I got from a reader suffering from mouse shoulder who desperately needed help. I was flabbergasted by the anecdote:

I've been searching for months for a trackpoint keyboard. If you hadn't given the part number (Inside Track, September 10, 1996) for the IBM trackpoint keyboard, I never would have been able to complete the order. The first rep refused to sell it to me, because I punched the number on the phone menu that meant I wanted it for "business" use. I had to call back and pretend to be a "consumer." Then IBM could

sell it to me. I got in about three games of Solitaire waiting.

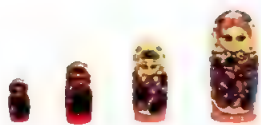
Let me get this straight. **The IBM rep wouldn't sell it?** This company manages to sandbag itself more than any other operation I've ever seen.

The Jinxed Machine Rises Once Again, Maybe,

Dept.: The hapless Amiga, a machine a decade ahead of its time (there's a lesson in there somewhere) was sold by a bankrupt Commodore to Germany's Escom AG two years back. Users hoped the sale would signal a revival, but Escom AG couldn't do anything with it and went bankrupt in July 1995, leaving the Amiga in shambles. Now the machine's design has been sold to VLS Corp, a Chicago-based set-top-box maker. Meanwhile, as a result of the bankruptcy, numerous companies are claiming rights to the machine.

No matter. VLS Corp plans to **revive the machine.** There is some talk about porting the Amiga's OS code to the PowerPC, which would probably be a great idea, since the Amiga OS remains **one of the great operating systems of the past 20 years**, incorporating a small kernel and tremendous multitasking capability the likes of which have only recently been developed in OS/2 and Windows NT. The biggest difference is that the Amiga OS could operate fully and multitask in as little as 256K of address space. Even today, the OS is only about 1MB in size. And to this day, there is very little a memory-hogging, CD-ROM-loading OS can do that the Amiga can't. **Tight code—there's nothing like it.**

I've had an Amiga for maybe a decade. **It's the single most reliable piece of equipment I've ever owned.** It's amazing! You can easily understand why so many fanatics are out there wondering why they are alone in their love of the thing. The Amiga continues to inspire a vibrant—albeit **cultlike**—community, not unlike that which you have with Linux, the Unix clone. Expect to see VLS Corp release a 68060 **upgrade board** for the machine. Amazing how high-quality machinery never dies an easy death. □

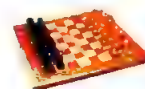


EASILY SCALABLE
STANDARD HIGH VOLUME
(SHV) SERVERS.

Data integrity
provided by Error
Correcting Code.



Dynamic Execution
enables the processor to
predict up to 30 software
instructions in advance.



{ Bottom. }

Designed with
multiprocessing
in mind.



Faster Web searches
with Pentium Pro
processor-based servers.



“By utilizing more powerful
Pentium Pro processor-based
platforms, we can reduce the
management overhead incurred
in system maintenance,
data replication, and adminis-
tration of these systems.”

Michael Spalter,
Senior Vice President
of Network Operations,
Countrywide Home Loans, Inc.

Pentium® Pro processor-
based servers with
open instrumentation
support a wide range
of management
applications including
LANDesk® Management
Suite, Tivoli TME 10,
and CA-Unicenter®
TNG* to name a few.

256K or 512K
on-board, L2 cache
for superior
SMP performance.



5.5 MILLION TRANSISTORS.
(Go ahead, count 'em.)

©1996 Intel Corporation. *Indicated names are
trademarks of other companies. †For additional
benchmark configuration and technical details, go
to www.intel.com/ia/web/servers/technical/SAP.htm.

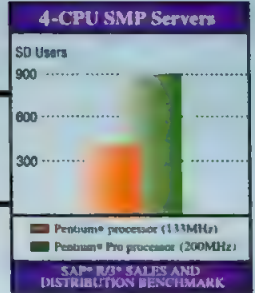
What Pentium® Pro processor-

The dependability of
Intel architecture.



"Intel Pentium Pro processor-based systems
and Windows NT[®] will deliver power and
scalability to SAP[®] R/3[™] customers at
unprecedented price/performance levels."

Paul Wahl,
President and CEO,
SAP America



The SAP R/3 Sales and Distribution (SD) benchmark measures the number of concurrent benchmark users and the average response time that they experience. The benchmark result was certified by SAP AG, Walldorf, Germany as of 5/96.

MORE USERS.
MORE TRANSACTIONS.
(Fewer headaches.)



Build stronger,
healthier
Intranet servers.



Meet the standard in business
computing, the Pentium Pro
processor (emphasis on "PRO").

Pentium Pro processor-based
servers and the right manage-
ability tools can reduce your
total cost of ownership.



{ Top. }

www.intel.com/pentiumpro

PROUD PARTNER

150
Smithsonian



Have a nice
Web experience.

based servers are made of.

intel.
The Computer Inside.™

Price and Performance of Your Next Computer Just Got Better ...

"12 years of experience",

in bringing new products to market will make a company define "state of the art." From multimedia to professional to workstation PCs, ProGen® systems offer the best value in the latest technologies. Expect equally solid service and support. ProGen® ProCare package features a 3-year limited warranty with 1-year on-site service*. Feature for feature, dollar for dollar, ProGen® Systems offers the best value around. Speak to a ProGen® consultant today and discover the difference or come and visit us at <http://www.progen.com> on the World Wide Web.

- On site service is based on the discretion of ProGen® technical support.
- Please call for leasing rate. Leasing Rate will vary depending on State Legislation, and is for business use only.
- 30-day money-back Guarantee (shipping cost not included)



ProGen® Discover MPEG

- Intel PCLset Based Systemboard
- 512K Pipelined Burst Cache
- 16 MB EDO RAM
- 1.6 GB Fast EIDE Hard Drive
- **ProGen® GOLD 64V+ 2 MB EDO (53 Trio 64V+), MPEG, Cinepak**
- WavePlayer 32PnP sound card
- 28.8Kbps FAX/Modem w/Voicemail
- Fast 8X EIDE CD-ROM Drive
- 1.44 MB 3.5" Floppy Disk Drive
- 4-device Bus Mastering Enhanced IDE Controller
- 15", .28dp PnP monitor
- 104-key Enhanced Keyboard for Win95
- Genuine Microsoft Mouse 2.0
- Microsoft Windows® 95 CD & Manual
- 80W PMPO Amplified Stereo Speakers
- CD Software Bonus Pak (Infopedia 2.0, Compton's New Media 200 EXPLORER, The American Heritage TALKING DICTIONARY, and BodyWorks 4.0)
- Microphone w/stand
- **ProGen ProCare Warranty (3-yr + 1-yr on-site)**



120 MHz	\$1399	133 MHz	\$1489
166 MHz	\$1699	200 MHz	\$1849

ProGen® Atlas

- **Intel Motherboard - Advanced/ML**
- 256K Pipelined Burst Cache
- 16 MB EDO DRAM
- 2.1 GB EIDE Hard Disk Drive
- **ProGen® GOLD 3D (S3 Virge)**
- 2 MB EDO DRAM w/3 Games
- WavePlayer 32PnP sound card
- 33.6Kbps FAX/Modem
- Various Communication Software
- Fast 8X EIDE CD-ROM Drive
- 1.44 MB 3.5" Floppy Disk Drive
- Windows 95 CD & Manual
- Windows 95 Keyboard & Microsoft Mouse 2.0
- **Panasonic 17" .27dp Digital PnP Monitor**
- CD Software Bonus Pak (Infopedia 2.0, Compton's New Media 200 EXPLORER, The American Heritage TALKING DICTIONARY, and BodyWorks 4.0)
- Microphone w/stand
- 80W PMPO Amplified Stereo Speakers
- **ProGen ProCare Warranty (3-yr + 1-yr on-site)**



120 MHz	\$1849	133 MHz	\$1919
166 MHz	\$2119	200 MHz	\$2299

**We accept VISA,
M/C, Discover, &
American Express**

ProGen®
SYSTEMS

A division of ProGen Technology Inc.

1-800-848-1353

Sales Hours:

M-F, 6:30 A.M. - 7:00 P.M. PST,

Sat, 9:00 A.M. - 3:00 P.M. PST

Tech Support/Customer Service:

M-F, 8:00 A.M. - 5:00 P.M. PST.

Customer Service: 1-800-848-8767

Technical Support: 1-888-777-5501

BBS: 714/566-9255 E-Mail: progen@ix.netcom.com.

ProGen® Technol Inc 15501 Redhill Avenue, Tustin, CA 92780 Ph: 714/566-9200 Fax: 714/566-9267

©1996 ProGen® Technology, Inc Intel Inside and Pentium Processor logo are registered trademarks and the Pentium Pro Processor logo is a trademark of Intel Corporation.

All other trademarks are the property of their respective owners. Prices are subject to change without notice.

CIRCLE 287 ON READER SERVICE CARD

Windows NT Revisited

A couple of issues back, I wrote about the huge move I foresee over the next 18 to 24 months to Windows NT Workstation 4.0 on the corporate desktop. "The Big *Business* Upgrade," I called it, because as important as I think Windows NT 4.0 is going to be

in enterprise settings, I'm convinced Windows 95 will continue to be the PC operating system of choice for most individual users for the next year or two.

In that column (September 10, 1996), I detailed some of the hardware upgrade choices I think those moving to Win NT 4.0 face, and my suggestions for which do and which don't make economic sense. But there are real software and usability issues to consider as well. Now, with Win NT Workstation 4.0 out the door in Redmond and appearing on PCs near you, let's look at some of those practical install-and-use issues.

Overwhelmingly, the biggest complaint I hear about Windows NT 4.0 from individual users is that shamefully—and for the first time in DOS/Windows history—there's no easy, essentially automatic upgrade path from earlier releases of Windows to NT 4.0.

What? Yep, that's right. I'm not kidding. This isn't one of those nice, easy upgrades where you pop the CD-ROM in the drive, it auto-starts, you click a few boxes, and then you go to lunch while the new version reads all of the old version's settings and replicates them, cleaning out the underlying Windows 3.x/Windows 95 files and migrating everything happily upward to Win NT.

Dear Microsoft: This stinks.

We can handle the lack of compatibility with older programs—Windows NT won't run many of them, even some of the Windows 95–logo programs that were supposed to be Windows 95– and Windows NT–compatible to get that logo. After all, Windows NT is all about breaking with the past, moving to a truly (well...) bullet-proof operating system.

We can handle the hefty hardware requirements, and we know by now not to believe the stories about how "you can run NT in 16MB, but it really flies in 32MB." Make that "runs OK in 32MB and flies, sort of, in 64MB."

We can handle losing meaningful Plug and Play, much as we liked how easy it made setting up Windows 95 machines—and as tough as it can be to set up Win NT 4.0 boxes.

We can live with this driver mess, with all of these new

drivers required for Win NT 4.0; after all, we were weaned on new-OS driver problems with earlier versions of Windows.

We can even handle paying three times as much for Win NT Workstation 4.0 as we did for Windows 95, though it's a little hard to understand why we should be asked to, if

Microsoft is serious about Win NT outside the corporate setting.

But we are not happy, Microsoft, with this no-upgrade-path stuff. Not happy at all. We deserve better.

The second big complaint I've heard from users of the late betas and the release version of Win NT Workstation 4.0 is that it doesn't provide the kind of performance kick you expect when you buy and install an OS that's three times as expensive as the last one on a new or heavily upgraded PC.

That's because—write this down, please—Win NT Workstation 4.0 is not a performance upgrade. Yet.

It offers the potential for great speed improvements in complex apps, as they learn to spin out separate, concurrent-execution threads, which Windows NT handles very well. But multithreaded operation demands multithreading applications, and you won't see many of those around yet. Or for a while to come. Moving current single-threaded apps to new Win NT–ready multithreaded code is not a trivial undertaking.

Win NT 4.0 running on a 200-MHz Pentium Pro machine—or better, on a two- or four-processor 200-MHz Pen-

tium Pro box—promises amazing performance jumps. But you won't see those big leaps right now.

Because in practice, Win NT is still a bet on the future—"betting on the come," as gamblers like to say.

That's why I think most PC users working on their own, without the budgets and support staff of a corporate setting, are going to be better off for a couple of years staying with Windows 95 and its successors. Until Windows NT can actually *deliver*, not just promise, big gains, it's not worth the big pains.

Understand, none of this is a retreat from my earlier words about the eventual—and, I think, inevitable—im-



FUTURE PROMISE

Until Windows NT can deliver big gains, it's not worth the big pains. It's a bet on the future.

PC
MAGAZINE

PCWEEK

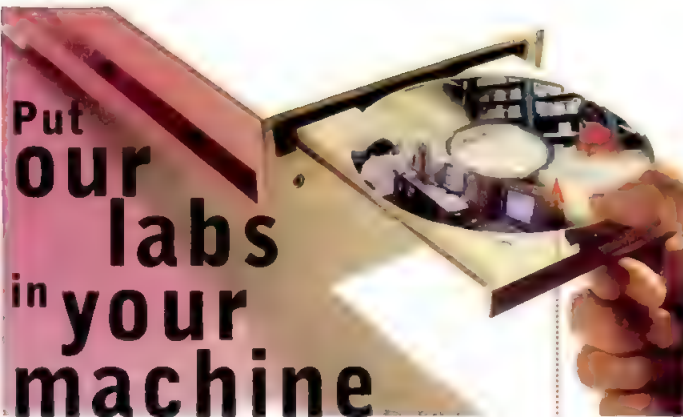
Windows

PC Computing

COMPUTER
SHOPPER

MacUser

MacWEEK



Put
our
labs
in your
machine

Thanks for the service you provide in giving us a set of benchmarks that are professional, realistic, and available. This puts more objective science into our industry and prevents a lot of hype."

Professor Richard G. Helps
Dept. of Manufacturing
Engineering & Technology
Brigham Young University
Provo, Utah

ZD Ziff-Davis Benchmarks:
The Whole World Watches

Ziff-Davis Benchmark Operation, 1001 Aviation Parkway, Suite 400, Morrisville, NC 27560

FREE!

Download our benchmarks from ZD Net/CompuServe (GO ZDBOP) or from our home page at <http://www.zdnet.com/zdbop>. Or, for a CD-ROM (\$6 each for shipping and handling) fax your credit card information to 919-380-2879 or send a check to ZDBOP. Allow 4 to 6 weeks for regular delivery or enclose your FedEx number.



WinStone*



WinBench*



NetBench*



ServerBench*



MacBench*

JIM SEYMOUR

portance of Windows NT. You'll want to run it someday. But today?

Update: Some time ago I wrote about presentation tools and techniques ("PC Presentations: The Schlepp Factor," March 12, 1996), and about all the weird stuff I carry in my so-called "Magic Bag" to make computer-based presentations go more smoothly. One of the tools I mentioned was the often-invaluable scan converter, a black box that turns the external VGA output of your notebook PC into a signal that can be displayed on any standard television set. This can save the day when a promised LCD projector or overhead-projector panel doesn't show up or isn't working.

Since then, I've been buried by questions about scan converters from readers, many of whom had never heard of them but wanted to know more and some of whom had horror stories about poor performance from even very expensive units.

I've made another pass through most of the available scan converters, and I still like TView's Presenter TView (\$365) best among the small, light units. TView units can be hard to find; you can reach the company at 800-356-3940, or at www.tvview.com.

I have also found another high-end unit that is a bit clumsy to carry around but makes a superb addition to a conference room setup: Communication Specialties' Scan Do Pro. About the size of a cigar box, it weighs 4 pounds. The Scan Do will turn any VGA output up to 1,024-by-768 into the best PC-to-TV picture you're likely to see. As with all scan converters, the image isn't as good as it would be on a computer monitor, and even with the Scan Do's underscan feature on, you'll still lose a little of the image around the edges. But the \$1,995 Scan Do, made for commercial and broadcast use, is spectacular. Call 516-273-0404 or visit www.commspecial.com.

Note that many of the new high-end notebook PCs, such as the IBM ThinkPad 560 and the Compaq Armada, include built-in scan conversion, albeit of uneven quality. If using a standard TV is important to you in a notebook, be sure to test that feature before buying.

Finally, what about just using a big computer monitor? Truly big (30-inch-plus) monitors have cost a fortune, but Gateway's new Destination PC, while meant primarily for the home market, delivers a high-quality, 31-inch screen with a very good VGA image—plus a fast 166-MHz PC—for about the price of some older 31- or 32-inch monitors alone. Gateway also sells this excellent monitor separately. □

PC Banking Benefits

Call it the Cuisinart Syndrome. The time you save slicing a batch of carrots with your food processor instead of with a kitchen knife is negated by the extra time it takes to clean all the parts of your laborsaving food processor. Similarly, not everything you do

with a PC truly saves time. Try booking your travel reservations on the Web, for example. Still, there's no question that computers are responsible for significant efficiency and productivity gains in other areas. The most obvious, of course, is word processing—and please spare me the homilies about how there's a different karma when you write rather than type. After word processing, I've concluded that the second-best reason for owning a PC is personal finance.

I've been using a personal finance program for a decade and have entered some 7,000 transactions. I've dabbled with Managing Your Money (too hard to use) and Microsoft Money (until recently, too little too late), but mostly I've used Intuit's Quicken. Entering checks in the electronic register versus writing them by hand is a wash as far as time expended is concerned. But once the data is in, everything else is faster. Reconciliation is quicker and easier, as is finding out whether you already paid so-and-so, or looking up how much you paid a year ago for a particular service. And with keyed-in amounts, you never mistake a hastily written 2 for a 7.

I'm happy to pay \$5.95 a month to be able to write checks electronically. That works out to the price of 19 first-class stamps, but if you have to do the math to decide if electronic bill-paying makes sense, it isn't for you. As they say about yachts: People who need to ask what the fuel costs should stay on land.

Personal finance is more than writing checks. You can also track investments, credit card payments, and loans. Two of my credit cards are now linked electronically to Quicken. One provides monthly account updates; the other has daily updates. After you use a merchant once and manually categorize the transaction (for instance, dining, auto service, or groceries), future transactions are automatically categorized. Combine that with the fact that it's easy to categorize your checks as you enter them, and you have a pretty good idea of where your money goes—except, of course, for all the cash expenditures that most people never track. Compared with ten years ago, we still don't have much money

in the bank, but now at least we know why—and in detail.

Over time, I've set aside other credit cards that don't have electronic statements, because I like knowing where my money goes, especially when it's done for me painlessly. I wish my savings bank had an online link to my checking account, but unfortunately, my bank seems to expend its energy on mergers rather than on new technologies. I'm sure that link will happen over time, though.

The more things improve, the more impatient you become for further improvements. I can't believe electronic payments take five business days, plus weekends, to process. And since big merchants move around, you live in constant fear that your credit card company will move from Delaware to Montana, and the payment won't track to the new address. (Turns out most payments get forwarded properly anyway.) Finally, some merchants are particular about dotting the *i*'s and crossing the *t*'s. I get a snippy note from the phone company each month saying it may not be able to credit my phone bill properly unless I supply a special 13-digit account number. Silly me, I've been using a 10-digit account number that I'll lay odds is absolutely unique: my phone number.

A more serious concern is that even with all the online help available, you're still left up in the air about how to categorize correctly transactions that are tax-related. And the video clips of advice from famous financial journalists that come with the CD-ROM versions are fluff.

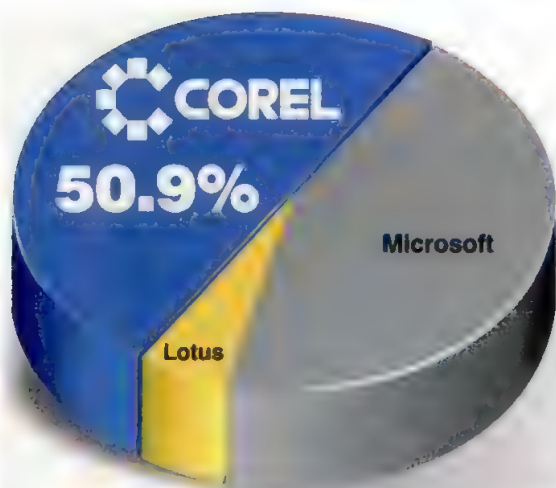
If you haven't yet succumbed, you should get hold of a personal finance program. Intuit's Quicken and Microsoft Money are both capable products. They cost less than \$50 and one or the other is usually bundled with most new home PCs. In fact, both may be bundled. Here's a little secret: Sometimes Microsoft *pays* PC vendors to include Money, typically by licensing them a software bundle that is cheaper with Money than without it. While Microsoft's attention is currently riveted on beating Netscape and ruling the Internet, there's no question that online banking is big, and Microsoft wants to be the 800-pound gorilla of that market, too. □



BOOKKEEPER

Compared with ten years ago, we still don't have much in the bank, but now we know why, at least.

COREL LEAPS AHEAD OF MICROSOFT IN OFFICE SUITE SALES



The word is out. Corel is the new leader in U.S. office suite sales.[†] Corel now has a 6% lead over Microsoft and more than ten times the unit sales of Lotus. Corel® WordPerfect® Suite 7's unbeatable combination of power, performance and Internet connectivity has catapulted it into the best-seller position. It is quite simply the most comprehensive office suite available. Software that lets you finish faster and accomplish more. Software that gets the most out of the 32-bit environment and the Internet. Corel WordPerfect Suite 7—breakthrough technology for the way business works today. Small wonder it's the #1 choice in office suites.



Office Suite Market Share

Company	%
COREL	50.9
Microsoft	44.7
Lotus	4.3

[†]Data received from PC Data, the most credible and comprehensive auditor of software sales in the U.S. Based on unit sales for MS DOS, Windows® and Windows® 95 products at retail, June 1996.

Corel and WordPerfect are registered trademarks of Corel Corporation or Corel Corporation Limited. Microsoft and Windows are registered trademarks of Microsoft Corporation. Lotus is a registered trademark of Lotus Development Corporation.

Visit any of our stores or call our nationwide toll-free number.

COMPUSA
THE COMPUTER SUPERSTORE™
1-800-COMPUSA
1-800-266-7872

CIRCLE 044 ON READER SERVICE CARD

*US\$ plus applicable taxes



Official Worldwide Sponsor of Bobsleigh



Corel, Official World Title Sponsor of the COREL WTA TOUR



<http://www.wordperfect.com>
Call now for faxed literature!
1-613-728-0826 ext. 3080



COREL WORLD, U.S.A.

October 20 - 23, 1996, Baltimore/Washington, D.C.

U.S.A. event for CorelDRAW™, Corel VENTURA™ and Corel PHOTO-PAINT™ users.

Hands-on workshops, product showcases, plus chances to win valuable prizes!



NETWORK EDITION

LAN ANALYZERS

Packet Detectives

LAN analyzers let you peek into packets to identify network problems. But which is the best one for your network?



By Les Freed

We know what you're thinking: LAN analyzers are for highly trained technicians who work on huge, global networks. They're expensive, difficult to use, and it takes an expert to understand the data they collect. Wrong.

Today's crop of LAN analyzers have something for everyone. Multiprotocol LANs are complex, and LAN problems are often difficult to sort out. A LAN analyzer lets you virtually look into the wire to see what's going on inside the LAN.

ILLUSTRATION BY CHRISTOPHER CHING

INSIDE



Keeping a network running smoothly can require a whole set of tools—everything from cable testers to an SNMP management platform. Some-

times a problem is a particularly tough nut to crack and you have to drill down into individual packets to find out what's really going on.

NETWORK ANALYZERS ARE the tools that let you peek into the packets flying across your LAN. For this Network Edition cover story, author Les Freed put four network analyzers through the paces, including the old standby, Network General's Sniffer. Les had a test-bed to work with, but that wasn't enough to satisfy his curiosity. He connected all four products to the PC Labs LAN and managed to find problems that we didn't even know existed.

WINDOWS NT SERVER 4.0 IS finally out of the gate. It adds a whole new slew of services to those in prior versions in an effort to be the all-purpose NOS. Contributing Editor Steve Rigney fired it up on our test-bed for a first look and came away impressed—he just about recommends a Windows NT server for every LAN. (Page NE25.)

LUCKMAN INTERACTIVE JOINS the Web server race with Web Commander, a \$129 product with a lot of interesting features, including credit card verification. See First Looks for a review. (Page NE26.)

DO YOU WANT TO BE READY for any catastrophe? In Multiple Access, Steve Buehler, Director of PC Labs, West Coast, tells you to take a look in the Yellow Pages for help in making your disaster plans. (Page NE30.)

—Leon Erlanger

WE'VE BUILT BIG-BUSINESS NETWORKING INTO A PC SERVER SOLUTION.



MICRON ELECTRONICS—YOUR DIRECT LINE TO COMPLETE, ECONOMICAL SERVER SOLUTIONS.

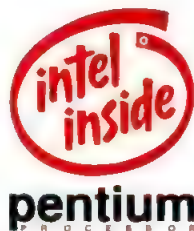
A PC server customized at our factory for your business. Whether you're buying your first server or expanding your network, it's a smart solution. And with Micron Electronics, one call gives you a server solution that's network-ready, custom configured and fully supported.

Network-Ready and Built for Your Business

Our PC Servers ship with Novell® NetWare® preinstalled and custom configured. When you call, a Micron Electronics sales specialist will discuss options and pricing with you. Our server product team tailors the network operating system and hardware to your workplace. You get a customized solution built for your business based on your direct input.



**Get Novell® NetWare® Pre-installed—
Direct from Micron's Factory!**





Fully Supported

Each system comes with a comprehensive service and support package, backed by our service partner, Digital Equipment Corporation. Each Micron Electronics Server purchase includes direct 24-hour telephone support, a comprehensive three-year warranty and three free network operating system incident resolutions. And we offer additional options like on-site installation and mission-critical support—as much or as little as you need.

Designed for Investment Protection

Built with the same design that's made our PCs award winners time and time again, Micron Electronics servers give you superior performance and value. You get dual-processor capability using Intel Pentium® processors, plus lots of expansion and upgrade options. With leading-edge performance that adapts to your changing needs, you can count on an economical solution that's built to last.

CIRCLE 924 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://www.pcmag.com/BuyerLink)

Call today for a customized price quote, hassle free. Or visit our Web site and build your own server with the MicronOpt™ configurator!



Micron Power™



Warranty & Support

- 5-year limited warranty on microprocessor and main memory
- 3-year limited parts-only system warranty
- 1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
- 30 days of free Micron-supplied software support for Micron desktop systems; 3 free network operating system incident resolution calls for Micron server systems
- 30-day money-back policy
- 24-hour technical support

This offering is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary by specific configurations. Copies of the limited warranty may be obtained on our Web site or by calling Micron.

MICRON™
ELECTRONICS, INC.

800-295-0543

<http://www.mei.micron.com>

©1998 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice; prices do not include shipping and handling. 30-day money-back policy does not include return freight and original shipping/handling charges, applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Lease prices based on 36-month lease. Intel, Intel Inside and Pentium are registered trademarks of the Intel Corporation. Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation. All other service marks, trademarks and registered trademarks are the property of their respective companies. PSVR-PCMG-98108

We looked at four PC-based LAN analyzers ranging in price from \$799 to \$15,000. The high-rent district includes two hardware-based products: Shomiti System's \$799 Century LAN Analyzer with an optional \$7,495 Century Media module, and Network General's \$14,995 Sniffer, Version 5.0. The Shomiti product is unique among the products we tested in its ability to monitor more than one 100MB LAN segment at a time, but in order to do so you'll need a Media Module card for each segment. This ability is especially useful in full-duplex switched Ethernet configurations where received and transmitted data travel separate paths. Without the optional Media Modules, Shomiti's Microsoft Windows-based software can be used with virtually any 10MB LAN card, giving the company an excellent entry into the low end of the market.

The DOS-based Sniffer has a well-deserved reputation for being powerful but expensive. Sniffer is the only one of the products we tested that can detect and identify problems with no user intervention. The Sniffer package includes a LAN adapter card and operates on 10- and 100MB LANs. In addition to the product we tested, Network General also offers versions of the Sniffer for FDDI and ATM LANs, Oracle 7 and Sybase client/server database LAN transactions, and router troubleshooting; all have similar management interfaces.

Novell's LANalyzer for Windows 2.2 (\$1,495) and Triticom's LANdecoder, Version 3.0 (\$945), are affordable, powerful software tools that provide excellent LAN analysis for organizations on a tight budget. These products provide most of the features of the high-end analyzers, but they are software-only products that—instead of using a dedicated capture card—work with your existing LAN card. The DOS-based LANdecoder is very easy to install and can run on a 486 PC. The Windows-based LANalyzer requires more in the way of computing resources, but it provides the best user interface and graphing functions of the four products.

We tested each of these products on a closed Ethernet LAN with 10- and 100MB hubs. Our test LAN had a file server running NetWare 4.1, another running Windows NT 4.0, and two Windows-based client PCs. We used each analyzer to capture and decode a NetWare login, a LAN file-copy transaction, and a browser session from a client PC to a Web server running on the Windows NT Server. We also used each product's traffic generator to

Editors' Choice

• Century LAN Analyzer, Version 1.1



All of the products we tested provide more than adequate tools for troubleshooting your network. But Shomiti Systems' Century LAN

Analyzer, Version 1.1, offers the most attractive combination of power and flexibility in this group.

For 10-Mb LANs, Shomiti offers a reasonably priced \$799 software version that works with any NDIS-compliant LAN card. It provides an excellent graphic user interface, support for dozens of protocols, capture and view filters, and the ability to read and write files compatible with Network General's popular Sniffer Network Analyzer.

If you require the power to handle a 100-Mb LAN, you can spring for the

hardware/software bundle, which adds significantly to the price (\$7,499 per card, with the ability to add up to 8 cards). It lets you monitor up to 8 100-Mb LAN segments, capturing huge amounts of data. Add a tap box and you can even monitor both sides of a full-duplex switched Ethernet connection.

Network General's Sniffer Network Analyzer continues to set the standard, but it starts at \$9,995 and is not as easy to use as the Century LAN Analyzer. The two other products, from Novell and Triticom, are decent solutions for organizations on a budget.

load down the LAN, and we introduced common LAN errors—a bad LAN adapter, excessive LAN traffic, and an invalid IP address—to the LAN.

As we expected, all four products produced essentially identical results, and all the products detected all the problems. But testing on a closed LAN is cheating, because we knew in advance what the problems were. To get a feel for how these products work in the real world, we tested them on PC Magazine's own real-world LAN. We learned a few things about our own LAN in the process.

All four analyzers showed that our LAN utilization never dropped below 3%, even in off-hours when very few people were using the LAN. A few minutes of LAN analysis showed a large amount of traffic between two stations. Examining the captured data, we could see a remote print server—recently moved from one office to another—attempting to log into a NetWare server. The NetWare server rejected the login because it didn't recognize the print server. Undaunted, the print server simply attempted to log into the NetWare server over and over—once every second! Our testing also uncovered several PCs with invalid IP addresses, a LAN adapter with a very high error rate, and a host of smaller problems.

In a sidebar, we also look at Fluke

Corp.'s Enterprise LANMeter 685, a self-contained, top-of-the-line portable LAN analyzer. While it doesn't actually decode packets the way the other products do, it's a remarkably useful device that provides some LAN analysis and testing tools not offered by most protocol analyzers. Other companies make similar products, and Fluke makes several less-powerful, less-expensive products.

In a second sidebar, we look at the LAN analyzer that comes with Windows NT Server 4.0.

LAN ANALYSIS

All LAN analyzers work on a capture-and-view basis: you first capture some data with the analyzer's capture function, then you browse through the data after the fact. A key function of LAN analyzers is their ability to decode the raw LAN data and display it in a form readable by humans.

All four of our test products use a similar three-window display to show the captured LAN data. One window shows a list of the data frames. As you move a pointer through the list of frames, a decoder window shows what protocol that particular frame uses, what the frame does, and what data—if any—it carries. A third window shows a hexadecimal display of the raw data in the frame; most users can safely ignore this window.

**Easy to Use. Easy to Install.
Easy to Afford.**



For just \$295* a user you can get the industry's most popular database server—Oracle7 Workgroup Server. With point-and-click installation, you can bring the power of the world's leading database to your business—simply. And with single-point management you can easily administer both remote and local database servers—across any operating platform, including NT or Unix.

The Oracle7 Workgroup Server. Easy to use. Easy to install. And easy to buy. Call Oracle at 1-800-633-0586, ext. 4437 today for more information. Or purchase directly from the Oracle Store at www.oracle.com/oraStore/welcome.html

ORACLE®
Enabling the Information Age™

*Price based on 5 user minimum, per concurrent user on any platform. U.S. pricing only. ©1996 Oracle Corporation. Oracle is a registered trademark, and Oracle7 Workgroup Server and Enabling the Information Age are trademarks of Oracle Corporation. All rights reserved. All other company and product names are trademarks of their respective owners.



ALMOST AS ABSURD AS A MODEM IN EVERY OFFICE.



With everyone screaming Internet access or die, maybe you don't think a modem in every office is absurd. But when you find out INSYNC's ModemShare lets your entire network access the Net with just a single modem and phone line, perhaps you'll reconsider. What's it all cost? Believe it or not you can start drastically slashing your phone bill for as little as \$129. And the best part about ModemShare – it's not your typical unsatisfying sharing experience. That's

because our unique technology allows for virtually transparent sharing of modems when browsing the Net, downloading files, desktop faxing, or remotely accessing office PC's. So instead of wasting your money on needless modems and costly additional phone lines, why not spend it on something useful? (And by that we don't mean additional restrooms.)

For a free 30-day trial of the full product, visit www.artisoft.com. Or call 1-800-809-1244 for the nearest authorized reseller.

INSYNC®



Free for 30 days @ www.artisoft.com

CIRCLE 858 ON READER SERVICE CARD

© 1996 ARTISOFT, INC. All rights reserved. INSYNC is a registered trademark, and ModemShare is a trademark of Artisoft, Inc.

Artisoft

On a fast or busy LAN, you can easily capture thousands of data frames in a few seconds. Sifting through several thousand frames can be a tedious and time-consuming chore, but all four products have tools to help ease the burden.

Capture and View filters allow you to select the types of frames you want to capture or view. Capture filters are the most useful, since they extend the amount of capture RAM available by excluding extraneous data. This allows you to limit your captured data to a particular protocol, a specific pair of network addresses, or to all transactions with a specific device. View filters provide similar functionality but operate after the fact; they allow you to sift through the captured data by including or excluding frames from view.

Capture triggers do just what their name implies; they tell the analyzer to watch LAN traffic and to begin capturing when a certain event occurs. This is useful when you want to watch for an intermittent problem such as excessive collisions or broadcast storms.

Two of our test products—Sniffer and

LANalyzer—also provide network monitoring. LANalyzer provides a neat dashboard-style display that uses speedometer-like gauges to show traffic and error statistics. The dashboard display is always visible, even when you're capturing data. Sniffer's network monitor shows the most detailed analysis of traffic.

All four products also provide some level of alarm monitoring. This feature allows you to set a predefined limit for some network condition and have the program alert you when that condition occurs. LANalyzer has the most flexible alarm monitor of our test group. You can program LANalyzer to sound an alarm on any combination of 11 user-defined conditions, such as network utilization percentage, error counts, or server overloads. LANalyzer can even execute another program when an alarm occurs.

While you don't need to be a protocol guru to understand the information provided by these tools, it does help to have a basic understanding of how a LAN works. LANdecoder's manual includes a brief but excellent tutorial on LAN pro-

ocols. Novell goes one step further—it provides a copy of *Novell's Guide to NetWare LAN Analysis* in the box and an excellent LAN tutorial on the disk when you buy LANalyzer.

Shomiti Systems Inc.

Century LAN Analyzer

ALL REVIEWS BY LES FREED



Shomiti Systems is a new player in the LAN analyzer business, but its Century LAN Analyzer impressed us enough that we awarded it an Editors' Choice.

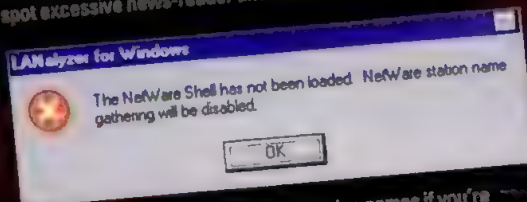
Shomiti offers two versions of the Microsoft Windows-based Century LAN Analyzer. The \$799 software-only version runs under Windows 3.1 or Windows 95 with any NDIS-compliant LAN card—including most PCMCIA LAN adapter cards.

For users with 100-megabit (100-Mb) LANs, Shomiti offers the \$7,499 Century Media Module, an ISA card that turns virtually any Windows-based PC into a

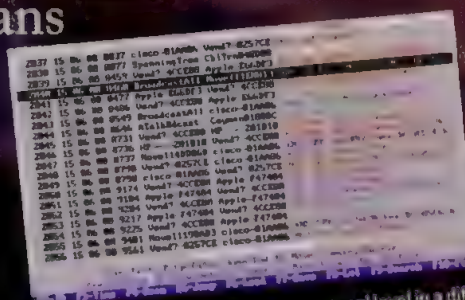
LAN Analyzer Picks and Pans



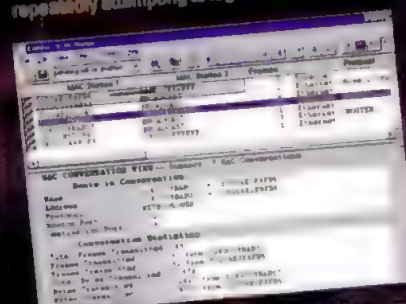
The Sniffer shows a wealth of information while it's capturing data. This screen shows LAN usage by protocol type (right), overall bandwidth usage (upper right), and TCP/IP traffic by type (location?). Net abusers will hate this last feature, because it allows LAN administrators to spot excessive news-reader and Web traffic at a glance.



LANalyzer can't figure out station names if you're using the Microsoft NDIS drivers for your LAN card. Installing Novell's ODI LAN drivers solves the problem, but Microsoft's drivers are easier to install.



LANdecoder shows each protocol level in a different color, making it easy to follow the interaction between two LAN devices. This screen shows our phantom print server repeatedly attempting to log onto a NetWare server.



The Century LAN Analyzer's Conversations display shows who's talking to whom, and how much they have to say to one another. This is a great tool for locating misconfigured routers and servers.



BEFORE YOU CAN CONTROL YOUR
YOU NEED MANAGEWISE TO PUT IT IN

WHOLE NETWORK, PERSPECTIVE.



Today's networks are complex by nature, which make them a perfect environment for ManageWise.™ Whether your network consists of NetWare® servers, Windows NT™ servers, OS/2® Warp clients or Windows® desktops, ManageWise keeps an eye on it all. Its easy-to-use interface helps you proactively manage and plan your entire network's growth—including your intranet and the Internet. ManageWise sees farther than other solutions, by alerting you of network bottlenecks, detecting user printing problems, and updating application access rights. It even lets you send applications from your desktop to individual users, reducing support costs.

For more details on our latest release, ManageWise 2.1, visit us at www.novell.com/managewise/ or call 1-800-665-4586 for your nearest Novell Platinum or Gold Partner.™ And bring your entire network into sharper focus.

www.novell.com/managewise/

ManageWise

Novell®
Everything's Connected.™

SUMMARY OF FEATURES

Network Analysis Tools



■ YES ■ NO □ OPTIONAL

Products listed in alphabetical order

	Century LAN Analyzer 1.1	LANalyzer for Windows 2.2	LANdecoder 3.0	Sniffer Network Analyzer 5.0
List price	\$799	\$1,495	\$945	\$14,995
Operating system	Windows 3.x, Windows 95	Windows 3.x, Windows 95	DOS	DOS
Capture Options				
Captures packets at 10 Mbps/100 Mbps	■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Captures multiple and full-duplex LAN segments	□ (\$7,499)	■	■	■
Capture filtering	■	■	■	■
Event trigger can start/end capture	■ ■	■ ■	■ ■	■ ■
Analysis Options				
Decodes captured data	■	■	■	■
Displays captured data	■	■	■	■
Includes traffic generator	■	■	■	■
Display Options				
Color-coded display of ISO levels	■	■	■	■
Auto-decodes vendor prefixes	■	■	■	■
Multiwindow display of decoded data	■	■	■	■
Monitors and Alarms				
Real-time monitor	■	■	■	■
Error-threshold alarms	■	■	■	■
Usage-threshold alarms	■	■	■	■

full-speed, multiport 100-Mbps LAN analyzer. Shomiti sells a separate version of Century LAN Analyzer (also \$799) for use with the Century Media Modules. Other than support for the Century Media Module, the two versions of the software are identical.

The software supports up to eight Media Module cards in a single PC, providing real-time multiple segment LAN monitoring for up to eight LAN segments. Each Century Card can have 4 or 16MB of RAM on-board, so you can capture a huge amount of data at once. Another benefit of the multiple-card approach is that by using two cards and a tap box—which sits between the PC and the hub and separates transmitted and received data—Century LAN Analyzer can monitor both sides of a full-duplex switched Ethernet connection. We tested Century LAN Analyzer with two Media Modules. We were able to capture both sides of a heavily loaded full-duplex 100Base-T connection with no problem.

Once the data is captured, the software provides several ways to view and analyze it. Separate capture and viewing filters allow you to limit the types of data frames read during capture or viewing—an important feature when you consider the amount of data you will capture on a busy 100-MHz LAN.

The software decodes dozens of LAN protocols, including the full suite of IP, IPX/SPX, AppleTalk, and NetBEUI/NetBIOS. You can view the captured data on a frame-by-frame basis or get an overview of the LAN data stream sorted by network conversation. This latter view is very useful, because it shows the source and destination address of each conversation on the LAN, along with the protocol type and frame count.

The software can read and write files generated by Network General's Sniffer protocol analyzer, making it attractive to the large base of Sniffer users.

The software-only product has few limitations compared with the full-blown product. Without the additional hardware, it can't provide multiple-segment monitoring. Otherwise, it is nearly identical to the hardware-based product. A 30-day trial version is available for download from Shomiti's Web site.

We tested the software-only version on several Windows 95-based notebook computers with a variety of PCMCIA LAN adapters. Installation was quick and simple, and all our test installations worked as expected.

The software looks a bit crowded on a 640-by-480 screen, so you may want to choose a notebook with an 800-by-600 display if you select Shomiti's Century LAN Analyzer.

Both versions of the Century LAN Analyzer are powerful solutions for those looking for an easy-to-use protocol analyzer.

Century LAN Analyzer, Version 1.0. List price: \$799. **Century Media Module.** List price: \$7,499. Shomiti Systems Inc., San Jose, CA; 888-746-6484, 408-437-3940; fax, 408-437-4041; www.shomiti.com. Circle 954 on reader service card.

Novell Inc.

LANalyzer for Windows

Novell's \$1,495 LANalyzer for Windows 2.2, though slightly NetWare-centric, is a comprehensive, easy-to-use LAN analyzer program for Microsoft Windows 3.x and Windows 95. NetBEUI and IP users, however, may feel short-changed by LANalyzer's lack of name detection for those protocols.

LANalyzer is the easiest to use of the four products we tested. Unfortunately, it is not the easiest to install. The program requires you to use the Novell NetWare client for Windows 3.x and Windows 95. Novell is so insistent about this that if you have the

Microsoft NetWare client installed, the LANalyzer installer offers to remove it and replace it with the Novell client.

LANalyzer documentation states that Novell would prefer that you use a Novell ODI LAN card driver instead of a Microsoft NDIS-based driver. We tried installation both ways and found that the NDIS-based drivers worked equally well with two exceptions: NDIS drivers tend to discard packets with errors, making it difficult to do error analysis and with NDIS drivers installed, the LANalyzer was unable to identify NetWare station names, which may be troublesome on a large LAN.

Installation issues aside, LANalyzer is a joy to use. The main screen sports three friendly speedometer-type gauges that show packets per second, network utilization, and error counts at a glance. Double-clicking on any of the three gauges produces a graph showing the last 15 minutes of activity.

Three lighted bars directly below the speedometers keep you abreast of any network, server or router errors that exceed LANalyzer's six-error threshold. You can stay on top of such information as total packets per second, utilization percentage, broadcast packets, fragmented packets, CRC errors, and server overloads.

**10 Mbps Or 100 Mbps
On Any Port.**



Now That's A Switch.

Now The Most Popular Fast Ethernet Switch Is Also The Most Affordable!



Network traffic only increases. That's why we offer the BayStack 28115 Fast Ethernet Switch. Not only is it the world's most popular Fast Ethernet Switch, but it also offers the best price/performance of any switch available. It lets you deploy 10 or 100 Mbps Fast Ethernet switching on all ports, so you can future-proof your network—adding bandwidth where and when you need it.

Equally important, you also get big-network reliability with redundant links and redundant power. That's because the 28115 Fast Ethernet Switch is part of our BayStack family that integrates hubs, routers and switches into a stackable, standards-based system. And with Optivity[®], you can manage your entire network as one cohesive unit—including remote sites.

So call **1-800-8-BAYNET ext. 205** for a free copy of our Fast Ethernet Deployment Guide and CD. Because if you're considering switching, now's the perfect time.



Making everything

work with everything shouldn't be

hard. It's simply about

taking all the many complexities

out of all your enterprise-wide

communications. We have ways

to make that happen.

**SPLANN
TO
MARKETS
SWAN
HOSTS**
**INTEGRATE
INTERN**

From your desktops to your hosts, IBM Enterprise Communications Software connects and makes the most of all your applications, platforms and networks, while it saves you time and money.

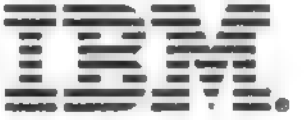
The biggest problem facing network managers today is getting all your desktops to talk to all your hosts without your users being baffled by the sheer complexity of everything. On top of that, you may be building an intranet or need to connect to the Internet. Trying to get everything right takes up too much time, and without question can cost too much money.

Lots of vendors seem to have part of the answer. Only IBM has the complete solution: our Enterprise Communications family of products. Personal Communications AS/400 and 3270 (PCOMM), for the easiest way to connect all your DOS, Windows® 3.1, Windows NT™, Windows 95® and OS/2® clients to all

your S/390®, AS/400® and System/36™ hosts. And our rock-solid IBM Communications Server for OS/390™, AIX®, OS/2 and NetWare®, provides flexible, scaleable, multiprotocol gateway support via TCP/IP and SNA.

Now, with the complete solution for network computing, everything can communicate with everything, seamlessly and transparently. So there's no more headaches. No more excuses. You and your users can enjoy all the benefits of network computing, while you get on with your business.

To find out more about IBM's Enterprise Communications family and how you can get a complimentary PCOMM evaluation kit, visit us at www.raleigh.ibm.com/pcomm or call 1 800 IBM-2468, ext. GA034. There's no smarter way through the communications maze.

Solutions for a small planet™ 

NETWORK EDITION

COVER STORY

Packet Peeking

While each of the products we tested has its unique features, all share a similar interface for displaying the contents of your network packets. This screen example comes from Novell's LANalyzer for Windows, but you'll find almost the same screen in all of the products.

The screenshot shows the LANalyzer for Windows interface. At the top is a menu bar with File, Monitor, Alarms, Capture, Decode, Window, and Help. Below the menu is a 'Capture Buffer' table with columns: No, Source, Destination, Layer, Summary, Error, and Size. The table contains several rows of captured packets. Below the table is a detailed view of a selected packet (packet 985), showing its structure and a hex dump. The hex dump shows the raw data of the packet, with a red bar at the bottom indicating an error count.

No	Source	Destination	Layer	Summary	Error	Size
983	00805F4CCE88	08000932381A	ncp	Rply Service Queue Job, No Queue Job		64
984	00000C01AA86	0800110257CE	ncp	Rply Unknown (Request not seen)		64
985	0800110257CE	00000C01AA86	ncp	Req Login Object TEH:0257CE		71
986	00000C01AA86	00001B19189E	spk	System Packet connID: 43437 / 611		64
987	00000C01AA86	0800110257CE	ncp	Rply Login Object, No Such Object		64
988	0800110257CE	00000C01AA86	ncp	Req Destroy Service Connection		64

----- NetWare Core Protocol -----
 NCP Request: Login Object
 Request Type: 0x2222 (Request)
 Sequence Number: 3
 Connection Number Low: 3
 Task Number: 1
 Connection Number High: 0
 Function Code: 23
 Subfunction Length: 5 bytes

0 00 00 0C 01 AA 86 08 00 11 02 57 CE 00 35 FF FF 5 q s v s
 10 00 35 00 11 00 71 18 24 00 00 00 00 01 04 51
 20 00 01 00 01 08 00 11 02 57 CE 10 03 22 22 03 03
 30 01 00 17 00 05 14 00 07 09 54 45 4B 30 32 35 37
 40 43 45 00
TEH:0257
 CE

Packet 985 Unfiltered: 1,771

When an error count exceeds the threshold, the status bar turns red and an error message scrolls through a small horizontal window at the bottom of the display. Clicking on the red bar displays a list of errors that exceeded the threshold.

Three additional monitoring windows are available. The station-monitor window shows a summary of all LAN traffic at a glance. It also shows all the stations on the LAN along with traffic and error counters for each station. You can change the sort order of this window by simply clicking on the desired column in the table (number of packets or bytes sent, for example).

When you use ODI drivers, the station-monitor window shows NetWare stations by name but raw MAC addresses for non-NetWare devices on the LAN. And unlike the other products we tested, LANalyzer doesn't automatically decode the Ethernet manufacturer ID, so IP, NetBEUI, and other non-NetWare devices show up as nearly meaningless 8-byte numbers. Fortunately, you can manually create a list of station names and Ethernet addresses to overcome this. Optional windows show the name and

status of each server and router on the LAN.

LANalyzer's data capturing and decoding features are incredibly easy to use. The three-window decoding display shows a frame-by-frame summary, decode, and full hexadecimal dump of each packet. As you move through the summary window, the data in the lower two windows updates to show the contents of the selected packet.

If your LAN is mostly Novell-based, LANalyzer provides excellent monitoring and decoding of NetWare IPX and SPX protocols.

LANalyzer, Version 2.2. List price: \$1,495. Novell Inc., Orem, UT; 800-453-1267, 801-429-7000; www.novell.com. Circle 953 on reader service card.

Triticom

LANdecoder

If you need a protocol analyzer but don't want to break the bank, Triticom's \$945 LANdecoder, Version 3.0, may be your best bet. Because it is DOS-based, it runs just fine on 486 machines. In fact, the combination of LANdecoder and an inexpen-

sive 486 laptop can put a portable analyzer in your hands for under \$3,000.

Previous versions of LANdecoder required large amounts of conventional memory. This often caused problems for memory-hungry PC Cards and socket drivers. LANdecoder, Version 3.0, is a protected-mode DOS application, which improves performance and eliminates the need for an expanded memory manager.

We had no problem installing and using LANdecoder on several desktop and notebook machines with a variety of LAN cards. LANdecoder works with most popular LAN card products. The product has a simple, straightforward menu system that even beginners can understand. The product's capture filters and triggers are easy to set up, but they're the least flexible ones we saw in this roundup. LANdecoder can capture up to 16MB of data at a clip, and it automatically writes the capture file to the disk if the RAM buffer fills up. This feature allows long, unattended capturing of a huge amount of data.

While LANdecoder is capturing, it offers a three-part view of the network. The normal view shows a station-by-station

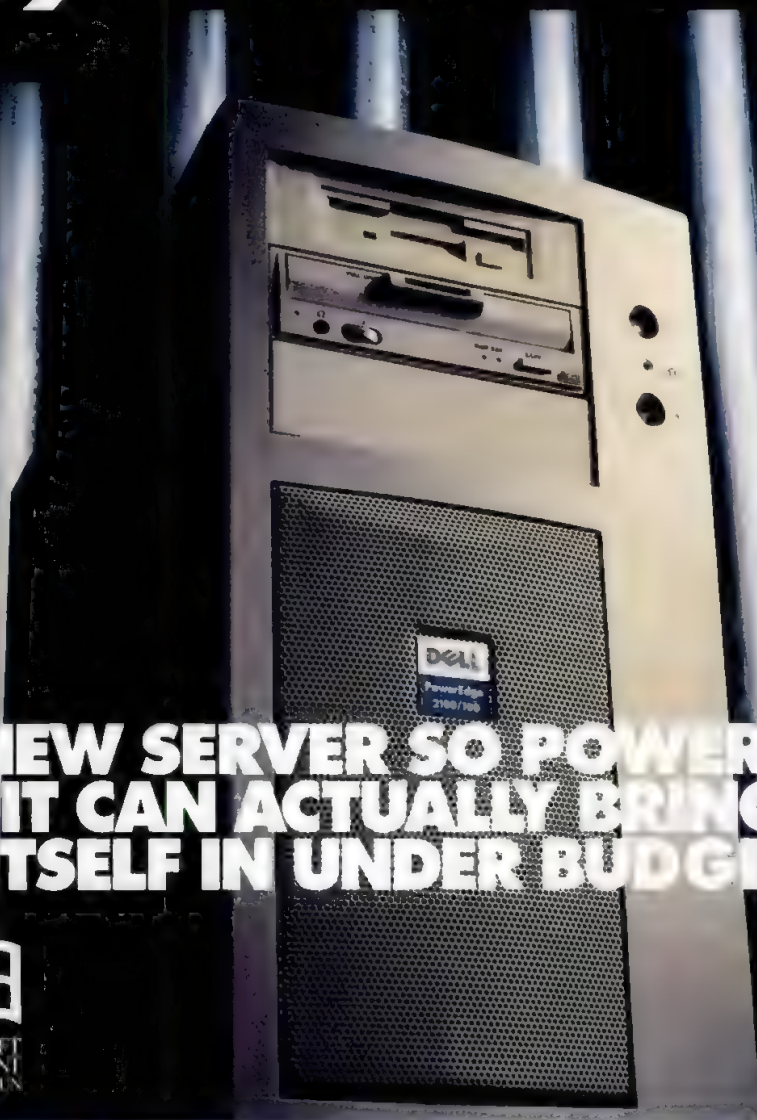
\$3499

160MHz PENTIUM® PRO PROCESSOR

- ★ 32MB Error Correcting Code (ECC)
EDO Memory (256MB Max)
- ★ 256KB Integrated L2 Cache
- ★ Integrated PCI Ultra/Wide SCSI-3 Controller
- ★ 2GB Fast/Wide SCSI-2 Hard Drive
[7200RPM, 8ms] (12GB Max)
- ★ 3X SCSI CD-ROM Drive
- ★ 3Com® 3C595 10/100 PCI Network Adapter
- ★ Intel® LANDesk Server Manager v2.5

- 6 Expansion Slots: 3 PCI, 3 EISA
- 6 Drive Bays: 3 External 5.25"/3 Internal 3.5"
- 3 Year Warranty* with 1 Year Next-Business-Day, On-site Service
- 24x7 Dedicated Server Hardware Tech Support
- Buy before 9/30/96 and get factory installed Windows NT® Server 3.51 at no additional charge.
- Upgrade to 64MB ECC EDO memory, add \$549.
- Upgrade to a 4GB Fast/Wide SCSI-2 hard drive, add \$450.

Lease: \$130/Mo.
Order Code #250011



**A NEW SERVER SO POWERFUL,
IT CAN ACTUALLY BRING
ITSELF IN UNDER BUDGET.**



PENTIUM PRO
PROCESSOR



MICROSOFT
WINDOWS NT
READY TO RUN

The 180MHz PowerEdge 2100 features Ultra/Wide SCSI-3 support for wickedly fast read/write to its 2GB hard drive (which you can expand to 12GB). It's loaded with 32MB of

Best of all, it's backed by our award-winning on-site service* and 7 x 24 dedicated server tech support line. Call to order yours today. At a price like this you can't afford to wait.



800-639-3355

<http://www.dell.com>

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm In Canada* call 800 233 0702

Keycode #04326

685 Enterprise LANMeter

The protocol analyzers in our roundup provide in-depth information about your network by decoding packets. Fluke Corp.'s unique 685 Enterprise LANMeter (\$11,495) doesn't decode individual datagrams, but it still offers an impressive suite of network monitoring, analysis, troubleshooting, and cable-testing tools that complement the other products in this roundup.

Looking more like an overgrown scientific calculator than a powerful network management platform, the LANMeter extracts network information by reading frame headers and by querying SNMP and RMON. It can test 100-Mbps Ethernet cable, hubs, and LAN cards, but monitoring functions can be used only with 10-Mb 10Base-T and 10Base2 networks. The LANMeter works with Ethernet and Token-Ring LANs. If you don't need the LANMeter 685's dual-media capabilities, Fluke offers the LANMeter 682 (\$8,495) for Ethernet and the LANMeter 680 (\$8,795) for Token-Ring.

At 11.5 by 6.5 by 2.5 inches and 4.5 pounds, the portable, battery-powered LANMeter is about two-thirds the size and weight of a typical notebook computer. It has a large, easy-to-read keypad and 3- by 5-inch backlit LCD.

We were able to hook the LANMeter to our test LAN and begin observing LAN traffic within minutes of opening the box. Depending upon how you connect it, the LANMeter has different uses. If you connect it to a hub, it operates as a network monitor and analyzer. In this mode, you can monitor traffic on the LAN. Though it doesn't decode data packets, it does monitor and categorize every datagram on the wire. The LANMeter keeps a running count of network packets and can display several charts and graphs showing LAN usage statistics. The product's lack of decoding ability can actually be advantageous, because it keeps network service personnel from seeing unencrypted user names, passwords, and other sensitive data on the LAN. On the downside, you can't examine LAN data to see application-layer interaction between a server and a client.

You can connect the LANMeter directly to a PC and test the PC's LAN card without connecting the PC to the LAN. You can also use both jacks on the LANMeter to connect the PC to the LAN. This configuration allows it to perform an extensive check on the communications link between the PC and the hub. You can also perform tests on the cable, including Category 5 certification.

The LANMeter is very easy to learn and use. It makes extensive use of a graphical display with five softkeys along the bottom of the screen. A logical menu structure and informative help messages guide you through each step of the operation. As you progress through the menus, the label on each softkey changes to show its function.

The LANMeter's comprehensive network monitoring and testing tools enable you to locate and diagnose problems quickly. For example, the LANMeter can automatically detect incorrect and duplicate IP addresses—a common problem on IP LANs. A Top Senders and Top

Receivers chart pinpoints stations that may be generating excessive traffic. During our testing, the LANMeter found several PCs with bad IP addresses and also pinpointed a remote print server that was burning up 3 percent of the total LAN bandwidth by repeatedly attempting to log into the wrong NetWare server.

The LANMeter includes a full suite of testing tools for IPX, IP, and NetBIOS networks. Our test unit was equipped with the \$995 Switch Wizard option, a suite of IP tools. We were particularly impressed with the IP Segment Discovery tool, which locates and lists every PC, router, host, and server on an IP network. You can zoom in on any IP device and perform diagnostics, including ping and DNS queries. The Switch Wizard option also adds an SNMP console for monitoring SNMP agents on the LAN.

The LANMeter's internal rechargeable battery pack provides about 3 hours of continuous use. Portability and relatively long battery life make it possible to walk the LANMeter to your wiring closet, plug it in, and perform troubleshooting tasks with no cables other than a LAN patch cord.

As we were completing testing, Fluke provided us with a beta copy of its LANMeter Utilities for Windows. This software, which should be shipping by the time you read this, lets you collect and save data reports and screen shots from the LANMeter.

With its powerful and flexible suite of utilities, the LANMeter 685 is strong enough to stand on its own, or you can use it to complement a protocol analyzer.—LF
685 Enterprise LANMeter. List price: \$11,495. Fluke Corp., Everett, WA; 800-443-5853, 206-347-6100; fax, 206-356-5116; www.fluke.com/nettools. Circle 951 on reader service card.



Portable Analysis: The LANMeter is a powerful network analysis tool but not a LAN analyzer per se.

summary of activity, along with traffic counts for each LAN conversation. This screen makes it easy to spot stations that are causing an unusually large amount of traffic on the LAN. The second is the sky view, which shows a simple, continually updated graph of total LAN traffic over time. The third, a summary view, gives a statistical look at the LAN, showing such

information as packet counts, average packet size, and peak load tracking.

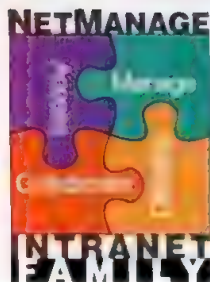
After you've captured the data, LAN-decoder uses a three-section Decode Display Mode, which shows a frame list along with a protocol decode, and a hexadecimal dump of the selected frame. A handy Find Next Pair function key allows you to trace a network conversation be-

tween two stations without setting up a filter in advance. Each OSI protocol level is displayed in a unique color, so it's easy to pick out the different layers. You can select a protocol decode level at any time by simply pressing the corresponding number (1 through 7) on the keyboard; the display updates immediately.

To help you determine who's who, LAN-



See How Our IntraNet Server Can Stimulate Colorful Discussions.



- Servers included are: NFS Server, LPD Server, Web Server, Directory Server, PC Net Time Server and DNS Server.
- Supports NetManage WebSurfer and any other Web Browsers.
- Supports a wide range of clients for NNTP, NFS, Web, LPD and Directory.
- Bundle includes Chameleon/NFS NT Client FREE.

NetManage IntraNet Server. The first IntraNet server suite for Windows NT.



Everyone's talking about NetManage's new IntraNet Server—the first easy-to-use and economical collaboration platform for Windows NT. At its core is the IntraNet Forum Server, an NNTP-based server that lets workgroups discuss and share information both easily and economically. The results are workgroups that work better together. Ones that make more informed decisions. And IntraNet Server is standards-based, so it's not only ready for your IntraNet, but any other NNTP client or server as well. IntraNet Server is part of the NetManage IntraNet Family—a full suite of products designed to help you build a powerful corporate IntraNet. Call now and GO! IntraNet today.

FREE!

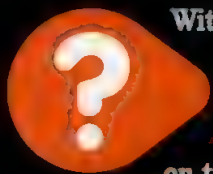
1-408-342-7534

NETMANAGE®
WE KNOW THE NET. INSIDE AND OUT.



sales.pcn@netmanage.com
www.netmanage.com

IF TWO TRAINS LEAVE CHICAGO AT THE OTHER DUE WEST, WHAT IS



Without the proper information, you can't make intelligent decisions. Seagate Software is all about getting the right information to the right people right away.

Our comprehensive portfolio of software solutions keeps your organization on track by making information and network management simple and efficient.

By automating tasks that once took up valuable time, you can get on with building your business.

Seagate Software. We make sure you're always moving in the right direction.

**5 PM, ONE GOING DUE EAST AND
THE POPULATION OF WISCONSIN?**

 **Seagate Software**
RUN WITH US.

STORAGE MANAGEMENT

NETWORK & SYSTEMS
MANAGEMENT

INFORMATION MANAGEMENT

Find the answers at www.seagatesoftware.com

©1998 Seagate Software, Inc. Seagate and the Seagate logo are registered trademarks of Seagate Technology, Inc.

Seagate Software and Run With Us are trademarks or registered trademarks of Seagate Technology, Inc. or one of its subsidiaries. p/n SSI-xxxx-AD-01D.

CIRCLE 671 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

Windows NT Server's Own Analyzer

If you have Windows NT Server 4.0, you already have a protocol analyzer. Microsoft includes a limited-function version of its Network Monitor with Windows NT Server 4.0. The full-blown version of Network Monitor is available only as part of Microsoft's Systems Management Server (\$1,198 for the server and 10 clients.) The free version provided with Windows NT Server lacks a few minor features found in the full version, but the biggest limitation is that the free version can only capture frames sent to and from a machine running Network Monitor. While this severely limits the program's usefulness as a LAN-wide troubleshooting tool, it's still very useful for monitoring traffic to and from a specific Windows NT Server machine.

Network Monitor uses your server's existing LAN card to collect data, so no additional drivers are required. To install Network Monitor, open the Network control panel, select "Services," click on "Add," and select "Network Monitor

and Agent" from the menu. Windows will prompt you to insert your Windows NT Server CD-ROM.

Like the other products in our roundup, Network Monitor captures data from the LAN for after-the-fact analysis. During capture, Network Monitor uses a multiple-window display to show detailed network utilization statistics, a list of the stations seen, and running counts of LAN traffic by station. Network Monitor provides basic but effective capture filtering and capture trigger features.

Network Monitor's capture buffer display is one of the best we've seen. Like buffer displays in the other products, it uses a three-window display that shows a packet list, a decoder window, and the raw packet data. A very thorough viewer filter and search tool help you quickly locate frames based on protocol type or station address.

Despite its intentional limitations, Network Monitor can still be a useful troubleshooting tool—and you can't beat the price.

decoder maintains a symbolic name list and can display stations by their MAC address, symbolic name, or IP address. It's very easy to scan the captured data for new names, and LANdecoder automatically saves new names to the list when you exit the program.

The product's traffic generator is very flexible, allowing you to specify the number of frames to be sent, an interframe delay interval, the destination address, and the data field to be sent.

LANdecoder can read and write captured files generated in LANalyzer, Sniffer, and several other LAN analyzers. Like Sniffer, LANdecoder's protocol support is excellent, providing full decoding for over 200 LAN protocols, including NetWare (3.x and 4.x), TCP/IP, AppleTalk, VINES, DECnet, NetBEUI, SMB, SNMP.

LANdecoder, Version 3.0. List price: \$945. Triticom, Eden Prairie, MN; 612-937-0772; www.triticom.com. Circle 955 on reader service card.

Network General Corp.

Sniffer Network Analyzer

First introduced in 1988, Network General's Sniffer Network Analyzer set the standard for LAN analyzers. Version 5.0 of Sniffer is powerful and feature-rich, but at \$14,995 for the Fast Ethernet version we tested, it is also the most expensive by far. A 10MB version is available for \$9,995. Both versions include the Sniffer software and LAN adapter card.

You also get Network General's years of experience in analyzer tools and its excellent reputation for technical support. Network General also offers versions of Sniffer for FDDI segments, ATM LANs, and client/server databases, such as Oracle and Sybase. All versions have similar interfaces, so once you learn one product it's easy to use another. Unfortunately, Sniffer still uses a DOS-style menu interface that begs for a GUI transplant.

Network General recommends installing Sniffer in a 100-MHz Pentium machine with at least 8MB of RAM. We tested it with a Dolch 100-MHz Pentium luggable—an option that adds another \$10,000 to the price tag. Since Sniffer is a DOS application, installation is as simple as plugging the card in and copying the software to your hard disk.

Sniffer software includes a monitoring application that provides a traffic history, a full suite of user-selectable alarms, and vital statistics. There's also a flexible traffic-generation tool. But Sniffer's protocol analysis program is the main course.

While it's capturing data, Sniffer lets you choose between two views of the LAN. The first—the Expert screen—is a powerful troubleshooting tool that can watch for common problems and suggest corrective measures. Every time we introduced a problem on the LAN, Sniffer was able to determine that a problem existed, but it did not identify the problem's exact nature.

The other view—the Global Statistics screen—displays a wealth of information, including utilization and error counters, a

breakdown of LAN traffic by protocol type, and a further breakdown of TCP/IP traffic by protocol.

Sniffer provides a complete set of filtering options that let you capture data selectively, based on frame type, error type, or a specific data pattern.

After you capture the data, Sniffer presents a sequential list of each captured frame. In most cases, you'll be looking for a specific type of problem. Sniffer's display filters let you zoom in on your data by source, destination address, a combination of the two, OSI protocol layer, and other parameters.

Sniffer's viewer uses a three-window format—copied by virtually every other protocol analyzer—which displays the frame list, a detailed protocol decode of the selected frame, and an optional hex dump of the same frame, each in its own pane. Network General provides full protocol decoding for over 200 protocols, including TCP/IP, NetWare IPX and SPX, AppleTalk, and NetBEUI.

Sniffer runs the PC display in text mode, which makes screen updates lightning-fast but limits Sniffer's graphing abilities. The basic Sniffer menus are easy enough to understand, but some of the more complicated operations—setting up a capture filter, for example—could benefit from a point-and-click interface like Shomiti's.

Sniffer Network Analyzer, Version 5.0. Fast Ethernet version, \$14,995; 10Mb version, \$9,995. Network General Corp., Menlo Park, CA; 415-473-2000; fax, 415-321-0855; www.ngc.com. Circle 952 on reader service card.

How to grow your Fast Ethernet network any way you want it.

Introducing Fast Ethernet workgroups from SMC.

Your network is growing.
Your problems are, too.
And Fast Ethernet is
your best way out of
the woods.

But with needs that
are rising and a budget
that isn't, how can you
add Fast Ethernet?

SMC Fast Ethernet solutions
let you integrate 100 Mbps
technology where you need
it now, and add nodes, band-
width, and management when
you need it later.

Start with EtherPower 10/100™
network cards and
EZ Switch™ Plus to deliver
10 Mbps to each workstation
and create 100 Mbps
trunks for your servers.

For power-hungry
users, build Fast
Ethernet workgroups
with the EZ Hub™ 100,
at a surprisingly low
price per port.



When it's time to
branch out, add the
SMC TigerStack™ 100.
These Fast Ethernet
stackable hubs deliver
unmatched seg-
mentability, and run on
Cat 3, Cat 4, Cat 5, or
fiber. So you can upgrade to
Fast Ethernet—without uproot-
ing your infrastructure.

Best of all, SMC Fast
Ethernet products come with
our Customer Satisfaction
Guarantee. It lets you leap
into Fast Ethernet—without
hedging your bets.

For more information on
SMC 100 Mbps solutions, visit
our Fast Ethernet
Integration Center at
www.smc.com/fe.

Or, call 1-800-SMC-4-YOU.

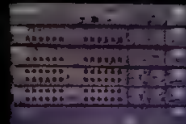
Because we make
Fast Ethernet very easy
to get into. And nearly
impossible to outgrow.



EtherPower 10/100
Fast Ethernet
Network Card



EZ Switch Plus
Six 10 Mbps/
Two 100 Mbps Ports



TigerStack 100
SwitchReady Fast Ethernet
Stackable Hubs

SMC®

Connect With Us.

For information on SMC products
call 1-800-SMC-4-YOU, Dept. TP31

<http://www.smc.com>

©Copyright 1996 Standard Microsystems Corporation
Windows NT is a registered trademark of the Microsoft Corporation.

CIRCLE 909 ON READER SERVICE CARD

New Our custom



Loss of power, loss of data, loss of sleep, loss of job - The quadruple curse of MIS pros. If you're like most MIS managers, worrying about the reliability of your datacenter has more than once made for a restless night's sleep. Now, APC provides custom designed power protection to fit your datacenter perfectly, so you'll never have to worry about your network power again. You'll be impressed by how quickly Matrix-UPS eases your mind once you've experienced instant notification of power problems and controlled shutdown of file and application servers running different operating systems. Matrix integrates with your SNMP management scheme, and you'll grow to depend on the "I forgot the Matrix was even there" reliability APC provides. That's why more networks count on this award-winning power protection than all other brands combined.

Custom SmartSlot™ Management Adds Uptime, Reliability

Now APC's award-winning accessories plug directly into the back of your Matrix-UPS. The new SmartSlot bay eases custom management configuration and enhances reliability. Simply select the SmartSlot accessories you need, and slip them into place! Receive alerts when high-temperatures caused by failed AC threaten your hardware, or perform remote, orderly system shutdown so you don't have to pay for extra support staff. Protect against unauthorized access to your network datacenter, or

Hot-swappable modules mean 100% uptime and double the battery life. Units can easily be serviced by your staff which replaces expensive service contracts. Fault tolerant design defuses the threat of a single point failure that plagues existing midrange UPS's.

Stephen Goudreau
Manager of East Coast Operations
Boy Networks, Inc.

"We currently rely on 15 APC Matrix-UPS to protect over two dozen UNIX servers, East Coast telephone switch and voice mail systems, and the routers, hubs and modem banks at Boy Networks. In the four months since the installation of these units, we've survived two campus-wide blackouts (and several brownouts) with no downtime of any of our APC protected equipment!"

"I must tell you to that I enjoy the features of the Matrix-UPS 5000 units. Plus, the scalability of the Matrix line allows us to protect all of our hardware - from wiring closets to the main datacenter!"

"I guess you could say we're all feeling a lot more comfortable here at Boy Networks knowing that our systems are protected by APC."



This unique modularity isolates any problems to their self-diagnosing, hot-swappable "block." Virtually every piece, even the batteries, tells you automatically when they need replacement. No downtime. No service delays. No unnecessary risk. No headache. All at half what you've been used to paying over a typical 5-year lifecycle.

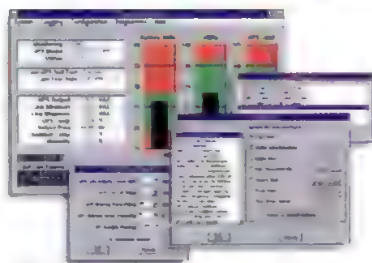
Matrix-UPS:

award-winning reliability is now enhanced for your datacenter

manage multiple, mixed O/S servers from one UPS. All these benefits and more are yours with SmartSlot Accessories.

Award-winning Reliability

Your new Matrix-UPS will even predict problems before they lead to expensive downtime. APC's modular design defuses the threat of a single point failure that plagues existing midrange UPS's, and makes installation a breeze. The unique, innovative modularity also isolates any problems to their self-diagnosing, hot-swappable 'block.' The resulting reliability will finally give you the chance to spend your time on more rewarding tasks, such as spending an evening with your family. Best of all, Matrix-UPS reduces the burden of service contracts and other high lifecycle costs.



APC's PowerChute plus and PowerNet SNMP software allow automatic safe shutdown and environmental monitoring to ensure uptime, protect data and lower support costs. For all major LAN and WAN OS, including NetWare and Windows NT.

Unlimited runtime suits any application

A Matrix-UPS 5000 with two SmartCells™ can support eight Compaq SystemPro (4000 kVA) servers for nearly 25 minutes. You'll also find that Matrix-UPS reliability has never been more affordable with list prices starting at just \$3599. Eight SmartCells provide two hours of back-up power. Now you or even non-technical personnel can quickly and easily add hours of runtime with new SmartCell™ XR's. They pack four times the runtime of a typical SmartCell, and allow you to customize and extend system uptime in the

event of a power outage. You can suit the needs of any application, and meet the changing demands of your network and your clients.

So don't fall apart with an outdated UPS. Take the expert advice of editors and datacenter managers around the globe and piece together the most reliable network possible with custom, modular Matrix-UPS power protection.

For sizing and runtime, call or visit <http://www.apcc.com>.

"Select all UPS equipment with component modularity in mind. This ensures that periodic servicing, circuit checking, and parts replacement can be accomplished easily and safely..." — AS/400 Planning Guide & Reference, IBM Corp.

"The first modular UPS with SNMP support... If you need managed power protection today and the flexibility to increase your coverage tomorrow, APC's modular Matrix-UPS provides fully paid insurance..." — PC Magazine

"APC killed many birds with one stone when they introduced the Matrix series UPS. It's cost-effective. It saves time. It's reliable. It's environmentally smart..." — Teleconnect Magazine

"...Just when you thought UPS technology hit a dead end, leave it to American Power Conversion to come up with Matrix-UPS, a scalable, SNMP-manageable UPS with hot-swappable components and cells. Protect your fileserver or an AS/400..." — PC Week, Network

APC has won more awards for reliability than all other UPS vendors combined.



FREE 30 Day Trial!

☐ **Yes!** Call me with more info about my 30-day FREE Trial. The Free Matrix-UPS enhanced solution package includes PowerChute plus award winning software and/or a SmartSlot Accessory. Choose from the Custom Management Package Options below left.

☐ **No** I'm not interested at this time, but please send me a FREE 60-page Power Protection Handbook

Name:

Company:

Address:

Phone:

Fax:

Email:

Is this your first contact with APC?

Yes

No

Reseller

End user

Number of Servers?

UPS(s) currently used?

Management package interested in:

Dept. E4

Offer limited while supplies last. APC reserves the right to end this special offer at any time and without notice.

Select your FREE Power Management Package:

- A Multiple Server/OS Management Option**
 - 3 copies of any PowerChute plus software*
 - SmartSlot UPS Interface Expander
- B Remote DataCenter Management Option**
 - 3 copies of any PowerChute plus software*
 - SmartSlot Call-UPS II
- C Environmental Management**
 - Option 1**
 - 3 copies of any PowerChute plus software*
 - SmartSlot Measure-UPS (Temperature only)
 - Option 2**
 - SmartSlot Measure-UPS (Temperature & Humidity)
- D Telecommunications Option**
 - 3 copies of any PowerChute plus software*
 - SmartSlot Relay I/O Module
- E Remote AS/400 Management Option**
 - Control-UPS/400
- F SNMP Management Option**
 - SmartSlot 10bc SNMP Adapter

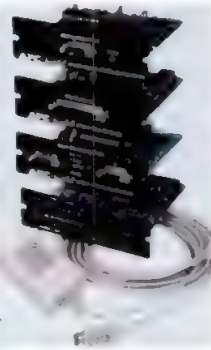
Call-UPS II™ Remote UPS Management Device
Remotely manage your APC UPS via modem. The unit provides complete UPS information, paging on power problems and remote safe reboot of servers via user supplied modem.

Remote Relay I/O Module
Integrates full UPS control into dry contact environments such as PLCs, telecom management and building security systems.

UPS Interface Expander
Provides two additional ports to facilitate safe system shutdown and advanced UPS management of up to three servers from one UPS. The unit is ideal for "server farms" or multiple operating system environments, since all three servers can be running different OSs.

Measure-UPS II™
Provides monitoring of temperature, humidity and other environmental conditions through the interface for PowerChute plus, PowerNet SNMP or Call-UPS II users.

PowerNet™ SNMP Adapter
Allows connection of your APC Smart-UPS or Matrix-UPS to an SNMP managed network for complete enterprise-wide UPS power management.



*Includes AS/400 cables. PowerChute plus for DEC VMS not available.

APC

AMERICAN POWER CONVERSION

1-888-BUY-APCC ext. 7020

<http://www.apcc.com>

(401)788-2797 Fax • (800)347-FAXX PowerFax
CompuServe: GO APCSUPPORT • Email: apctech@apcc.com
132 Fairgrounds Road, West Kingston, RI 02892 USA



Netscape Plug-ins and Web Server Objects. Get ready to launch dynamic business applications out on the World Wide Web with PowerBuilder 5.0.

Now you can use market-leading PowerBuilder® 5.0, together with Powersoft's new web.pb™ to build real-world applications that run on any Web server, access corporate data with our patented DataWindow™ technology, and generate HTML on the fly for your favorite Web browser.

What's more, PowerBuilder 5.0 lets you create applications that run as Netscape Plug-ins for any Plug-in compatible browser. And since



Visit us at www.powersoft.com
and you may win free products
or other great prizes.



Powersoft

PowerBuilder 5.0 supports ActiveX controls, you can extend your applications' reach even further with new Internet components.

So "Web-ize" your applications today with PowerBuilder 5.0. It's available in three editions: Desktop, Professional, and Enterprise. To explore it at one of our seminars or to get more information, call us at 1-800-395-3525. And get ready to send your PowerBuilder applications into orbit.

web.pb for Web Server Development

Window Plug-ins

DataWindow HTML Generation

ActiveX Support

Multi-Tier Application Partitioning

Compiled Code

Designed for Windows® 95

ObjectCycle™ for Version Control

Native Database Drivers

Foundation Class Library

©1996 Sybase, Inc. All rights reserved. Powersoft, PowerBuilder, web.pb, DataWindow, and ObjectCycle are trademarks of Sybase, Inc. or its subsidiaries.

All other trademarks and registered trademarks are property of their respective owners. (501) 395-3525. <http://www.powersoft.com>

CIRCLE 873 ON READER SERVICE CARD. OR GO TO [HTTP://WWW.POWSOFT.COM](http://WWW.POWSOFT.COM)

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

NETWORK OPERATING SYSTEMS

Windows NT Charges 4-ward

By Steve Rigney

Though it may not have the largest share of the NOS market, Microsoft Windows NT Server 4.0 definitely has the most features. In addition to established features—file-and-print sharing, a universal client, and built-in remote access—Windows NT Server 4.0 has a new Windows 95-type interface, an Internet server, Network Monitor—reviewed in this issue's Network Edition cover story—Web Designer, Administrative Wizards, bandwidth aggregation, a multiprotocol router, a DNS server that allows you to set up user names without remembering the whole address, and PPTP, which allows you to connect to a Windows NT server using any network protocol.

You must, however, pay for these features. With a retail price of \$809 for a single copy with five client licenses, installing a client on everyone's PC may be costly. Also, we recommend installing the server on a PC with at least a Pentium processor and 32MB of RAM. But Windows NT Server is a platform for so many functions that almost every LAN will have it running on at least one PC, providing some kind of Web, gateway, backup, or protocol-handling function. Windows NT Server can connect to almost any LAN, and its universal client and multiprotocol support make it a productive addition to your network.

Unlike its closest rivals, NetWare and IBM OS/2 Warp Server, Windows NT Server

has a full-featured Internet server—the Internet Information Server (IIS). Similar to Netscape's Web server, IIS is a breeze to set up, and you can control and manage it remotely via the Internet, as long as you have the necessary privileges and a Web browser. In addition to the HTTP Web server, IIS also includes an FTP and Gopher server for sharing files on the Internet or intranet.

In addition to IIS, Windows NT Server includes Microsoft

FrontPage, an Editors' Choice winner ("Build Your Own Web Site," May 28, 1996). FrontPage installs separately, and it makes creating professional Web pages easy, without knowing a single line of HTML code.

On the LAN side, Windows NT Server includes an impressive number of protocols and services. Windows NT works with the IPX, NetBEUI, and TCP/IP protocols, both across the LAN and by a dial-up remote-access-server connection.

You can use Microsoft's NetWare gateway service to share all the files and printers on your NetWare servers with NT Server clients. Windows NT Server also provides an Apple file and print service that allows you to connect your Macs to the server. Using the built-in client software, you can connect your Windows NT Server to PCs running NetWare, OS/2, Windows for Workgroups, LANtastic, and other Windows NT servers. This is the first version of Windows NT that works fully with Novell's NDS, allowing you to log in in NDS mode. This means that you can manage your directory tree and all network resources. Windows NT Server 4.0 is also the first version that can execute your NetWare login script, which saves NetWare administrators lots of time.

Windows NT has always included basic management capabilities for tracking users and network resources, but these utilities were typically difficult to set up and use. In Version 4.0, these network utilities are easier to use, and Microsoft has even added new ones such as Network Monitor.

Like a low-end protocol analyzer, Network Monitor lets you keep track of all server traffic, both coming and going. You can set up filters to see how much of your available bandwidth is being consumed by certain users or network protocols. Windows NT Server also includes a new graphical version of Microsoft's diagnostics utility, which lets you monitor memory and disk usage as well as other hardware and software settings.

Remote users will be especially fond of the new bandwidth aggregation feature in-

WINDOWS NT SERVER 4.0			
✓ YES ✗ NO ■ OPTIONAL	Microsoft Windows NT Server 4.0	NetWare 4.1	OS/2 Warp Server
Products listed in alphabetical order			
General Features			
No dedicated PC required			
Works with IPX, NetBEUI, TCP/IP			
Built-in remote access			
Remote-file synchronization utility			
Internet server			
Internet browser			
Centralized administration utility			
Global directory service			
Basic network management utilities			
Network traffic analyzer			
E-mail			
Bandwidth aggregation for analog/ISDN lines			
Multiprotocol router			
Client Software			
DOS			
Windows 3.x/Windows for Workgroups			
OS/2			
Macintosh			
* NetBIOS			

NETWORK EDITION

First Looks

cluded in the product. Though complicated-sounding, bandwidth aggregation lets you combine multiple connections to increase overall throughput.

For example, using a built-in specification called Multilink Point-to-Point Protocol, you can combine two 64-Kbps ISDN channels to provide a single 128-Kbps pipe. Windows NT bandwidth aggregation also works with regular analog phone lines. On our tests, we combined two 28.8-Kbps modems on one Windows NT server to establish a 57.6-Kbps connection to another server that also had two 28.8-Kbps modems. You can keep adding lines as your bandwidth needs increase.

Like NetWare, Windows NT

has a multiprotocol router that can control the flow of AppleTalk, IPX, NetBEUI, and TCP/IP packets between LAN segments. This router lets you segment your network and reduce congestion.

Though Windows NT Server has never been difficult to set up and administer, this version's Administrative Wizards make it even easier to use. The Wizards walk you through such basic tasks as sharing your hard disk, connecting to network resources, and creating a new user. On a NetWare 4.1 server, these same tasks would require that an experienced user read the manual carefully and experiment.

In addition to the features Windows NT Server has in this



From October 14 to 18, discuss Windows NT Server 4.0 with reviewer Steve Rigney and representatives from Microsoft. Type GO EDITOR on CompuServe.
WWW.PCMAG.COM

CROSSTALK



Frank Dorfner

“Leon, I see Windows NT Server infiltrating itself into every LAN. Even in all-NetWare shops, the appeal of the IIS Web server and the popularity of Windows NT as a platform for other services will bring Windows NT Server in through the back door. Despite its price, Windows NT Server 4.0 will slide into many niches.”

“You’ve spent too much time in Redmond, Frank. Novell is fighting back with an excellent Web server in NetWare 4.11, and the NetWare multiprotocol router is top-notch. Novell is placing renewed emphasis on NDS, and that’s a stronger strategic rock than having a few spiffy services.”



Leon Erlanger

incarnation, a few others are in the works. Microsoft says that Web Administrator and Index Server will soon be available free at its Web site. Web Administrator lets you manage your Windows NT 4.0 servers using any Web browser. Index Server au-

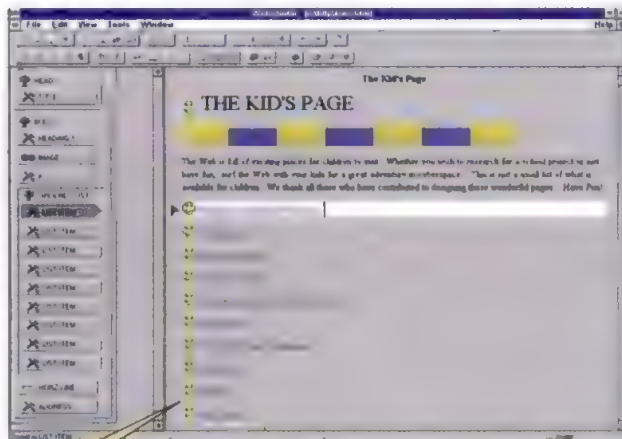
tomatically builds a list of all the files on your server’s hard disk. **Windows NT Server 4.0.** List price: Server and 5 clients, \$809. Microsoft Corp. Redmond, WA; 800-426-9400, www.microsoft.com. Circle 956 on reader service card.

WORLD WIDE WEB SERVERS

Luckman Interactive Takes Command

By Brad Edwards

With the price of Web servers falling each day, the low-priced duo from Luckman Interactive comes as no surprise. Web Commander, Luckman’s inaugural product, sells for \$129 for the Microsoft Windows 95 version and \$249 for the Windows NT Server Version. Though it’s true that free Web servers abound, such as Microsoft’s IIS (if you have the time and bandwidth to download it), Web Commander is still priced well under



WebStudio simplifies the creation of HTML documents.

much of its competition, such as Commerce Builder and Spry SafetyWeb, which retail for \$995 and \$1,295, respectively.

You get different features for those prices—Commerce Builder’s Chat Room or the in-

tegration of Windows NT user accounts found in Commerce Builder, for example—but Web Commander comes through with HTML authoring tools, automated credit card clearing and verification, built-in ODBC database support, and a Java development kit. And it supports CGI, ISAPI, and SSL.

Installing and configuring

Web Commander is both straightforward and quick, if you already have a domain name. The Windows NT version supports multihosting, so one server can serve multiple domains.

Once up and running, Web Commander keeps track of vital statistics and logs server errors. It keeps track of who accesses what files as well. A

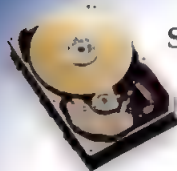
“hot hits” log is a list of the most frequently accessed files and directories. From the Web server program, you can browse the server’s document tree, and with the click of a button you view or edit a selected file.

One of Web Commander’s unique features is its credit card verification feature, WebCharge. With WebCharge, you can conduct credit card transactions over the Internet by entering card transactions either manually or automatically from a CGI script or an HTML page.

With financial transactions over the Internet come security concerns. Web Commander handles security in several ways. First is user authentication. Users and groups are created manually or by batch from an imported text file. Pages are then set up to allow access only to authorized users and groups. You can also allow or deny access to a list of domains and IP addresses.

Web Commander also uses the S-HTTP and SSL proto-

This ain't no fish story.



Seagate Barracudas offer more performance choices than any other high-end disc drive.

Barracuda is the drive family that blows everything else out of the water.

Seagate Barracuda drives come in a number of configurations to meet the capacity and performance requirements of the most demanding, and most popular SCSI applications.

The Barracuda low-profile drives are available in 2 and 4 Gigabyte models, and the biggest half-height Barracuda of all time weighs in at 9 Gigabytes. Catching a new Barracuda will satisfy

your appetite for all high-end SCSI storage requirements.

Seagate Barracudas combine 7,200 RPM performance, Advanced SCSI Architecture and the latest technologies (including MR heads, embedded servo and PRML channel), so there is never a wait for your data. Tie these technologies to Ultra SCSI and Fibre Channel and you'll see performance that will make your head swim.

It's easy to get your hooks on the biggest, most ferocious fish in data technology. Just call 408-438-8111 or visit www.seagate.com.



Model	Model #	Capacity	Interface	Transfer Rate
Barracuda 4LP	ST32171*	2.15 GB	Ultra SCSI 8/16 bit FCAL	Up to 40 Mb/s Up to 200 Mb/s**
Barracuda 4LP	ST34371*	4.35 GB	Ultra SCSI 8/16 bit FCAL	Up to 40 Mb/s Up to 200 Mb/s**
Barracuda 9	ST19171*	9.10 GB	Ultra SCSI 8/16 bit FCAL	Up to 40 Mb/s Up to 200 Mb/s**

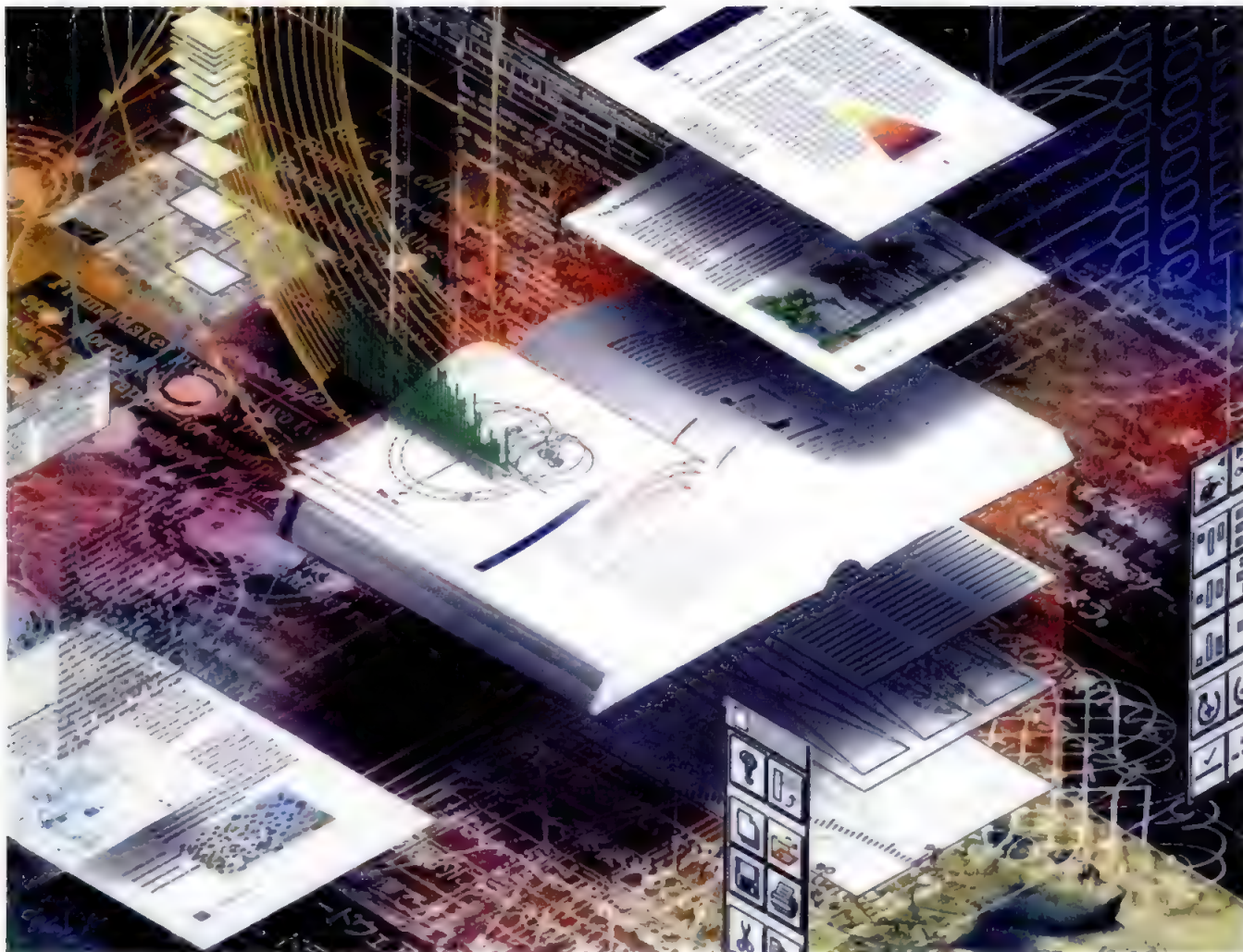
* Industry leading 7200 RPM performance and optional SCA connector
** In data-intensive configurations

 **Seagate**

THE DATA TECHNOLOGY COMPANY

Seagate and the Seagate logo are registered trademarks and Barracuda is a trademark of Seagate Technology, Inc. © 1996 Seagate Technology, Inc.

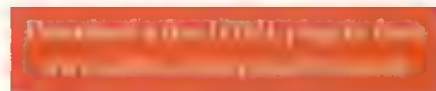
ADOBE FRAMEMAKER 5 *on* WINDOWS 95 & NT. MAKES SHORT WORK OF LONG DOCUMENTS.



Adobe® FrameMaker® 5, the leading document publishing software, automates your time consuming authoring, formatting, and page layout tasks. And now its multi-platform® support includes Windows® 95

and NT. Adobe FrameMaker lets you easily create long documents like books with cross-references and indices. What's more, it's the perfect tool to distribute

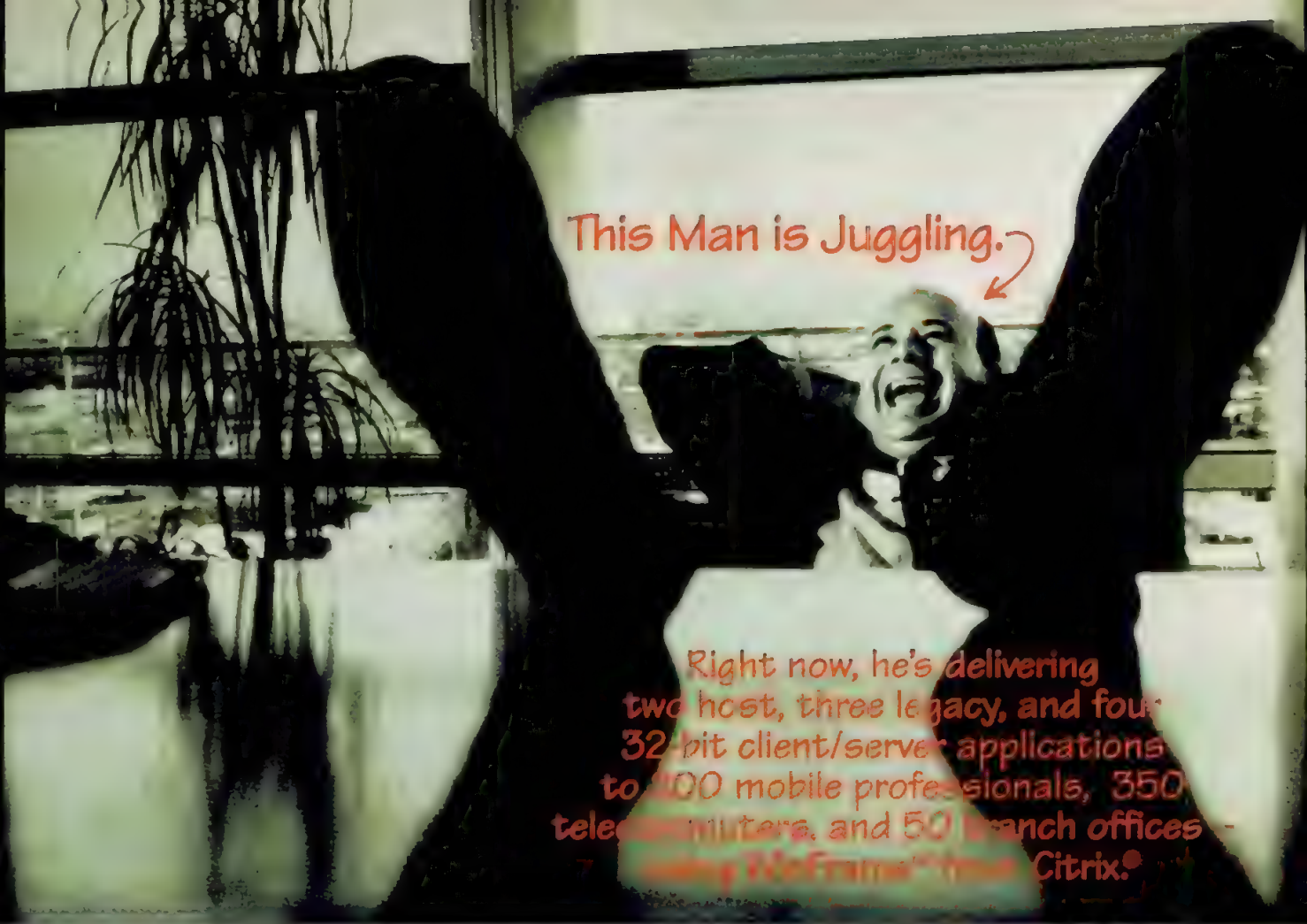
critical documents on the Internet and intranet, making it easier than ever to publish online product documentation, business proposals, engineering specs, training manuals and more. If you've got a big job on any platform, now you've got the power to meet the challenge. For more on Adobe FrameMaker 5, call 1-800-388-9883 extension 23706.



If you can *dream* it, you can *do* it.™



*Also available on Windows 3.1, Macintosh®, Power Macintosh®, and UNIX: SunOS®, Sun® Solaris®, HP/UX, Digital UNIX®, Silicon Graphics® IRIX®, IBM® AIX®, Adobe, the Adobe logo, FrameMaker and the tagline, "If you can dream it, you can do it" are trademarks of Adobe Systems Incorporated. All other marks are the property of their respective companies. ©1996 Adobe Systems Incorporated. All rights reserved.



This Man is Juggling.

Right now, he's delivering
two host, three legacy, and four
32-bit client/server applications
to 100 mobile professionals, 350
telecommuters, and 50 branch offices
using WinFrame™ from Citrix.®

It seems like an impossible juggling act — deploying applications outside your LAN to mobile professionals, telecommuters and branch offices. You face high costs. Network bottlenecks. Complicated user configuration. And, worst of all, poor application performance. Even the best remote node servers and branch office routers can't solve these remote computing problems.

WinFrame lets you juggle these challenges with ease. An authorized extension to Windows® NT™ Server, WinFrame turns an ordinary Pentium server into a powerful multi-user application server. Using Citrix's innovative ICA® protocol, WinFrame executes 16- and 32-bit applications on the server, while only the user interface displays on remote desktops. This means WinFrame helps you:

- **Deploy Applications Faster.** WinFrame slashes application deployment time and effort. Its thin, universal client

software (under 200kb) is all users need to run any application — anywhere.

- **Reduce Application Ownership Costs.** Quickly, conveniently configure, support and manage applications for thousands of users, all from a single WinFrame server.
- **Leverage Your I/T Investment.** WinFrame works with your existing remote access infrastructure, reduces network traffic, and extends the life of your existing desktop hardware. In fact, WinFrame clients can range from legacy PCs to Pentiums, from Macs to UNIX workstations.

WindowsWithoutWalls
CITRIX

www.citrix.com

800-779-5838

WinFrame Test Drive Kit

Relax. Let WinFrame do the juggling while you take the credit. Call 800-779-5838 or write us at winframe@citrix.com, and we'll let you see what it's like to be a WinFrame client — for free!



NETWORK EDITION

First Looks

cols, both of which use a public-key cryptosystem for encryption and authentication. But to use S-HTTP or SSL, you need an RSA Key pair. With Web Commander's Security Wizard you can e-mail a form to obtain the RSA Key pair from VeriSign. The first-year cost is \$290; each year thereafter costs \$75.

Following the current trend, Web Commander provides built-in ODBC database support, which allows you to access any database if you have the proper ODBC driver. This feature lets you create dynamic Web pages that pull information out from databases.

Like most other Web servers on the market, Web Commander includes authoring tools—a Web page wizard, HTML document editor, and image map creator. The Web

page wizard, WebPage, is useful only as a starting point, however, because the pages it produces are not very creative. The HTML document editor, WebStudio, is easy to use but doesn't work with many Netscape or Microsoft extensions. But the image map editor, WebMap, was excellent. If you've ever created an image map by hand, you'll appreciate this tool.

Web Commander also includes CGI Versions 1.1 and 1.2, ISAPI, Java, and server-side includes (SSI). SSI commands act as macros and variables and can be used to include a common header or footer on every page. On our tests, we found this feature to be handy for setting up pages quickly.

With the included Java Development Kit, you can also

create and embed programs for interactive multimedia-rich Web pages. Web Commander doesn't bundle the latest release of Java, but you can download it from java.sun.com.

Web Commander's CGI support provides a way to send information to the Web server, which in turn can create a customized page based on that information. ISAPI is similar but runs as a .DLL on the Web server and can be much faster, especially on heavily loaded servers.

Web Commander also comes with two different search engines. When installed under Windows 95, only the WAIS (Wide Area Information Server) search engine is available. It searches only text documents and is difficult to use: It requires PERL programming.

When Web Commander is installed under Windows NT, Excite for Web Servers is available as well. Excite searches HTML and plain-text documents and presents the results to the user in order of relevance. You can customize the output by modifying a PERL script, but we found the process somewhat difficult.

With its many tools and features, Web Commander stands up well to its competition. A forthcoming release will include firewall and proxy capabilities.

Web Commander, Version 1.0. List price: For Windows 95, \$129; for Windows NT Server, \$249. Luckman Interactive Inc., Los Angeles, CA; 800-711-2676; fax, 213-614-1929; www.luckman.com. Circle 957 on reader service card.

MULTIPLE ACCESS By Steve Buehler

The Sky Is Falling



With disaster movies like "Twister" at the box office and real-life security concerns at the Olympics and at airports, now might be a good time to dust off your disaster plans and...

What? You still have no disaster plan? You're sure you had one... wait... there it is—last updated when the Mets first

won the Series. (Sure, you figured if *that* could happen, *anything* was possible.) If that's your problem, here's your solution: the *Disaster Recovery Yellow Pages*, from Systems Audit Group (617-332-3496). It's a bargain at \$98. This thick loose-leaf book is a directory for all kinds of disaster planning and recovery services. Organized into sections—Consulting and Services, Hotsites, Emergency Equipment Resources, Software, and Training—this book indexes over 2700 U.S. vendors in more than 300 categories relating to disaster preparedness and recovery services. Although the topics cover what you'd expect—computer repair specialists, data and records recovery, and new or used equipment—there are also entries for drying and dehumidification of paper and microfilm records, emergency mobile satellite dishes, and sandbag-filling equipment.

I looked through the list and was impressed by the scope and extent of the coverage. Lots of thought went into including all these topics. The brief introductory section led me

through all the preliminaries of a disaster plan. All the basic questions about preparing for loss of data, services, personnel, and so on were raised. The real prize at the bottom of this box, however, was in leafing through the topics. The listings sections and subsections of available services started raising questions about whether my current disaster recovery strategy was adequate or even complete. For example, here at PC Magazine Labs on the West Coast, we're in a guard-secured facility: I'm much more worried about break-ins. I found I could skip the Post Crime/Post Trauma and Forensic Accountants sections for today's concerns. We are, however,

very near the San Andreas Fault, so I am worried about cleaning up broken glass and fallen debris. I went straight to Disaster Specialist Cleaning Companies and found one right here in San Francisco. And since we're on landfill, one hot summer day I may check out Odor Counteracting Services to see what can be done.

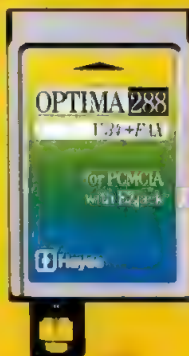
The network administrators I know don't tend to spend much time updating disaster recovery plans. It's too easy to get caught up fixing today's problems or planning the migration to faster networks. If you already have a disaster recovery consultant

helping you, or if you just outsource your computer processing, then you may not need this index. But if deep in your heart, you think Chicken Little may yet be proven right, this is a cheap investment that could help kick your disaster planning into gear. Maybe you won't wait until the Mets win the Series again to update your plan.

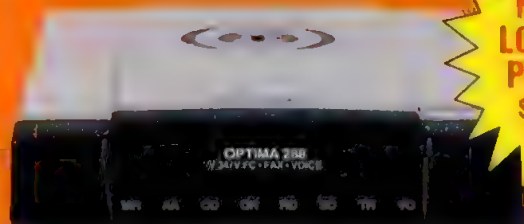


Hayes Business Solutions. All The Pieces For Enterprise Connectivity.

**"COOL"
PC
CARD**



**NEW
LOWER
PRICE
\$299
ERP**



**DESIGNED FOR
WINDOWS 95**

**LOWEST
COST PER
PORT**

**WITH
SNMP**



Hayes OPTIMA offers the complete high-speed solution. Now the Hayes Century 2 offers the proven award-winning performance of up to 16 Hayes OPTIMA 288 modems in a rugged, SNMP-managed rack system. All this for one of the lowest costs per port in the industry.

Hayes OPTIMA Modems Give You The Advantage!

Industry Tests and Awards

- ◆ Award-Winning 230,400 bit/s
- ◆ Flash ROM
- ◆ Dial-back and Password Security
- ◆ Caller ID**
- ◆ Remote Configuration
- ◆ Preassembled/Preconfigured/Pretested
- ◆ Voicemail and FAX-On-Demand***
- ◆ Distinctive Ring
- ◆ Hot Swappable
- ◆ Plug and Play

Clean Sweep



** Available on OPTIMA 288 Business Modem and Century only
*** Available on OPTIMA 288 Business Modem only

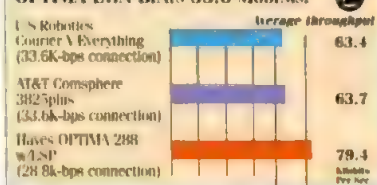
Independent industry testing continues to prove that Hayes OPTIMA modems are the fastest you can get*. It's no wonder Hayes OPTIMA has captured so many industry awards for technology,

performance and preference. It's Windows NT compatible, too!

In addition to the performance features of OPTIMA, the Hayes Century 2 now offers an SNMP management agent that works with all SNMP-compliant network management software. Hot swapping insures minimal downtime. Backed up by Hayes' legendary support and service, Century 2 is the right choice when speed and reliability are crucial.

For more information on Hayes Business Solutions, call **Hayes Fax Response** at 800-HAYES-FX and select Document 976. Or call 800-374-8388, Ext. 720.

OPTIMA Even Beats 33.6 Modems!



Hayes
INCREASING THE SPEED
OF BUSINESS.

* Tests conducted by industry publication labs. * Reprinted from PC WEEK September 18, 1995. Copyright © 1995 Ziff-Davis Publishing Company. Call Hayes Online: 770-446-6336. Hayes Worldwide Web Site: <http://www.hayes.com> or Telnet to "hayes.com". © 1996 Hayes Microcomputer Products, Inc. P.O. Box 105203, Atlanta, GA 30348. Hayes the Hayes logo and the Hayes logo are registered trademarks, and Increasing the Speed of Business, OPTIMA and Century are trademarks of Hayes Microcomputer Products, Inc.

CIRCLE 926 ON READER SERVICE CARD

Did you get my document?

Yeah, I made a few changes.

INTRODUCING NETWORKS WITHOUT LIMITS.
MADE POSSIBLE BY WINDOWS NT
WORKSTATION AND KINGSTON MEMORY.



Unleashes
the power of
Windows NT® 4.0

If you want to take your network and business to a higher level, you need Microsoft® Windows NT® Workstation. Of course, an operating system that powerful should be fueled only by the finest memory: Kingston®. You'll see productivity go through the roof. People will be downloading vital information from the Internet. Running multiple 32-bit applications at light speed. And sending messages



and images back and forth across the planet. So, why Kingston memory? Kingston engineers use exactly the same specifications as system manufacturers, like DEC,™ Compaq,® HP,® and IBM.® And they test every cell on every chip on every module. (On a 16 megabyte module, that's 128 million cells.) Besides, Kingston memory costs far less than the system manufacturers'. To find out more, call (800) 259-9342 today. And watch your network really take off.

Kingston
TECHNOLOGY CORPORATION

For more information call us at (800) 259-9342



Visit our Web site: <http://www.kingston.com/pcm.htm>

Kingston Technology Corporation, 17600 Newhope Street, Fountain Valley, CA 92708 USA, (714) 435-2600, Fax (714) 435-2699 © 1996 Kingston Technology Corporation. All rights reserved. Kingston memory is compatible with Windows NT Workstation. Kingston is a registered trademark and Computing Without Limits is a trademark of Kingston Technology Corporation. Microsoft and Windows NT are registered trademarks of Microsoft Corporation. All other trademarks are the property of their respective owners.

UNIX, PC, X terminal and Mac users brazenly cohabitating.

Result of our
new software for
NT, or nasty
tabloid rumor?



Software has never been quite so scandalous. New NTRIGUE lets everyone standardize on Windows 95, 3.1 and NT applications, regardless of age, gender, or hardware preference. (Even the weird stuff, like Mac Classics.) NTRIGUE allows remote access, links your Windows apps to your Web pages, and runs Office 95 up to 100% faster than WinDD and WinCenter Pro. To begin playing matchmaker with the ultimate Intranet server, phone 1-800-848-7677 today. Better yet, contact us at **INSIGNIA**  <http://www.insignia.com> for an online demo. It'll be the mother of all group hugs.

Insignia Solutions is a registered trademark and NTRIGUE is a trademark of Insignia Solutions Inc. UNIX is a registered trademark licensed exclusively through XOpen Company, Ltd. Mac is a trademark of Apple Computer, Inc. Windows NT and Office are trademarks, and Microsoft is a registered trademark of Microsoft Corporation. All other trademarks are the properties of their respective owners. ©1996 Insignia Solutions, Inc.

WE'RE ON A SERIOUS POWER TRIP.



With outstanding service and the Micron Power warranty to back it up, the **Millennia Pro™** from Micron Electronics delivers superior power. Get a full range of options, including 200MHz of computing power for extra-high performance. Now we are matching the hardware power of the Pentium® Pro processor with powerful system software by introducing the new 32-bit operating system everyone is talking about—Microsoft® Windows NT® Workstation. Purchase a Millennia Pro today for the leading performance and service that make Micron Electronics the powerhouse of the industry.

Millennia™ Pro200

- Intel 200MHz Pentium® Pro processor
- 256KB internal cache, flash BIOS
- 8X EIDE CD-ROM drive, 3.5" floppy drive
- 16 bit stereo sound & speakers
- **PCI 64-bit 3D video, MPEG, 4MB EDO**
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows NT® Workstation CD*
- 5-year/3-year Micron Power™ warranty

- 16MB EDO RAM • 1.2GB EIDE hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Works 95 CD

\$2249 Bus. lease \$77/mo.

- 32MB EDO RAM • 2.1GB EIDE hard drive
- 17" Micron 17FGx, .26dp (15.8" display)
- Microsoft Office Pro 95 & Bookshelf 95 CDs

\$2899 Bus. lease \$99/mo.

*Microsoft Windows NT Workstation 3.51 or 4.0 CD available on selected configurations.

Millennia™ Pro200 Plus

- Intel 200MHz Pentium Pro processor
- 256KB internal cache, flash BIOS
- PCI 32-bit Ultra SCSI Fast-20 controller
- 8X SCSI CD-ROM drive, 3.5" floppy drive
- 16 bit stereo sound & speakers
- **PCI 64-bit 3D video, MPEG, 4MB EDO**
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT Workstation CD*
- Microsoft Office Pro 95 & Bookshelf 95 CDs
- 5-year/3-year Micron Power warranty

- 32MB EDO RAM • 2GB Fast SCSI-2 hard drive
- 15" Micron 15FGx, .28dp (13.7" display)

\$3349 Bus. lease \$114/mo.

- 64MB EDO RAM • 4GB Fast SCSI-2 hard drive
- 17" Micron 17FGx, .26dp (15.8" display)

\$4399 Bus. lease \$150/mo.

- 128MB EDO RAM • 9GB Fast SCSI-2 hard drive
- 21" Micron 21FGx, .26dp (20.0" display)

\$7499 Bus. lease \$236/mo.



- 5-year limited warranty on microprocessor and main memory
- 3-year limited parts-only system warranty
- 1-, 2- or 3-year optional on-site service agreement for Micron desktop systems
- 30 days of free Micron-supplied software support for Micron desktop systems
- 30-day money-back policy
- 24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.

International Sales: 208-893-8970 International Fax: 208-893-7393

Tollfree from Puerto Rico: 800-708-1756

Tollfree from Canada: 800-708-1758

Tollfree from Mexico: 95-800-708-1755

• 800 E. Karcher Road, Nampa, ID 83657 • Mon-Fri 8am-10pm Sat 7am-5pm (MT)

• International Sales Hours: Mon-Fri 8am-7pm (MT)

• (208) 893-3434 • Fax: (208) 893-3434 • Purchase Order Fax: (208) 893-6992

• QUA Certified ISO9001:1997

• Technical Support Available 24 Hours A Day-7 Days A Week

• Technical Support E-mail: techsupport.mic@micron.com

MICRON™
ELECTRONICS, INC.

800-554-5232

<http://www.mei.micron.com>

©1998 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice, prices do not include shipping and handling. 30-day money-back policy does not include return freight and original shipping/handling charges. Applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Intel, Intel Inside and Pentium are registered trademarks of the Intel Corporation. Microsoft, Windows the Windows logo and Windows NT are registered trademarks of Microsoft Corporation. All other service marks, trademarks and registered trademarks are the property of their respective companies.

CIRCLE 925 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)



DON'T MISS THIS CHANCE TO GET FREE NETWORKING PRODUCT INFORMATION!

Get the information you need from products featured in our Network Edition section with our fast access inquiry card. Just tear it out, even use it as a bookmark and circle as you GO. You can FAX it too. It's that easy. Look for this card located near the back of this issue.

PC MAGAZINE

FREE PRODUCT INFORMATION

It's the quick and easy way to get detailed information mailed directly from the manufacturer free of charge

- CIRCLE the numbers that correspond to the items you'd like more information
- CHECK OFF your answers to the questions below.
- FAX your request to (609) 829-0692 or mail this card and we'll pay the postage!

PRODUCTS FEATURED IN NETWORK EDITION

820	821	822	823	824	825	826	827	828	829	830
831	832	833	834	835	836	837	838	839	840	841
842	843	844	845	846	847	848	849	850	851	852
853	854	855	856	857	858	859	860	861	862	863
864	865	866	867	868	869	870	871	872	873	874
875	876	877	878	879	880	881	882	883	884	885
886	887	888	889	890	891	892	893	894	895	896
897	898	899	900	901	902	903	904	905	906	907
908	909	910	911	912	913	914	915	916	917	918
919	920	921	922	923	924	925	926	927	928	929
930	931	932	933	934	935	936	937	938	939	940
941	942	943	944	945	946	947	948	949	950	951
952	953	954	955	956	957	958	959	960	961	962
963	964	965	966	967	968	969	970	971	972	973
974	975	976	977	978	979	980	981	982	983	984
985	986	987	988	989	990	991	992	993	994	995
996	997	998	999							

1 If you would like to receive more information on any of the following products, please check the appropriate boxes:

2 Do you want a DPMS card?

3 Is your company a reseller?

4 Number of employees in your entire company

5 Name of company

6 Address

7 City

8 State

9 Zip

10 Fax

11 Phone

12 E-mail

13 Other

14 Comments

15 Name

16 Title

17 Company

18 Address

19 City

20 State

21 Zip

22 Fax

23 Phone

24 E-mail

25 Other

26 Comments

27 Name

28 Title

29 Company

30 Address

31 City

32 State

33 Zip

34 Fax

35 Phone

36 E-mail

37 Other

38 Comments

39 Name

40 Title

41 Company

42 Address

43 City

44 State

45 Zip

46 Fax

47 Phone

48 E-mail

49 Other

50 Comments

51 Name

52 Title

53 Company

54 Address

55 City

56 State

57 Zip

58 Fax

59 Phone

60 E-mail

61 Other

62 Comments

63 Name

64 Title

65 Company

66 Address

67 City

68 State

69 Zip

70 Fax

71 Phone

72 E-mail

73 Other

74 Comments

75 Name

76 Title

77 Company

78 Address

79 City

80 State

81 Zip

82 Fax

83 Phone

84 E-mail

85 Other

86 Comments

87 Name

88 Title

89 Company

90 Address

91 City

92 State

93 Zip

94 Fax

95 Phone

96 E-mail

97 Other

98 Comments

99 Name

100 Title

101 Company

102 Address

103 City

104 State

105 Zip

106 Fax

107 Phone

108 E-mail

109 Other

110 Comments

111 Name

112 Title

113 Company

114 Address

115 City

116 State

117 Zip

118 Fax

119 Phone

120 E-mail

121 Other

122 Comments

123 Name

124 Title

125 Company

126 Address

127 City

128 State

129 Zip

130 Fax

131 Phone

132 E-mail

133 Other

134 Comments

135 Name

136 Title

137 Company

138 Address

139 City

140 State

141 Zip

142 Fax

143 Phone

144 E-mail

145 Other

146 Comments

147 Name

148 Title

149 Company

150 Address

151 City

152 State

153 Zip

154 Fax

155 Phone

156 E-mail

157 Other

158 Comments

159 Name

160 Title

161 Company

162 Address

163 City

164 State

165 Zip

166 Fax

167 Phone

168 E-mail

169 Other

170 Comments

171 Name

172 Title

173 Company

174 Address

175 City

176 State

177 Zip

178 Fax

179 Phone

180 E-mail

181 Other

182 Comments

183 Name

184 Title

185 Company

186 Address

187 City

188 State

189 Zip

190 Fax

191 Phone

192 E-mail

193 Other

194 Comments

195 Name

196 Title

197 Company

198 Address

199 City

200 State

201 Zip

202 Fax

203 Phone

204 E-mail

205 Other

206 Comments

207 Name

208 Title

209 Company

210 Address

211 City

212 State

213 Zip

214 Fax

215 Phone

216 E-mail

217 Other

218 Comments

219 Name

220 Title

221 Company

222 Address

223 City

224 State

225 Zip

226 Fax

227 Phone

228 E-mail

229 Other

230 Comments

231 Name

232 Title

233 Company

234 Address

235 City

236 State

237 Zip

238 Fax

239 Phone

240 E-mail

241 Other

242 Comments

243 Name

244 Title

245 Company

246 Address

247 City

248 State

249 Zip

250 Fax

251 Phone

252 E-mail

253 Other

254 Comments

255 Name

256 Title

257 Company

258 Address

259 City

260 State

261 Zip

262 Fax

263 Phone

264 E-mail

265 Other

266 Comments

267 Name

268 Title

269 Company

270 Address

271 City

272 State

273 Zip

274 Fax

275 Phone

276 E-mail

277 Other

278 Comments

279 Name

280 Title

281 Company

282 Address

283 City

284 State

285 Zip

286 Fax

287 Phone

288 E-mail

289 Other

290 Comments

291 Name

292 Title

293 Company

294 Address

295 City

296 State

297 Zip

298 Fax

299 Phone

300 E-mail

301 Other

302 Comments

303 Name

304 Title

305 Company

306 Address

307 City

308 State

309 Zip

310 Fax

311 Phone

312 E-mail

313 Other

314 Comments

315 Name

316 Title

317 Company

318 Address

319 City

320 State

321 Zip

322 Fax

323 Phone

324 E-mail

325 Other

326 Comments

327 Name

328 Title

329 Company

330 Address

331 City

332 State

333 Zip

334 Fax

335 Phone

336 E-mail

337 Other

338 Comments

339 Name

340 Title

341 Company

342 Address

343 City

344 State

345 Zip

346 Fax

347 Phone

348 E-mail

349 Other

350 Comments

351 Name

352 Title

353 Company

354 Address

355 City

356 State

357 Zip

358 Fax

359 Phone

360 E-mail

361 Other

362 Comments

363 Name

364 Title

365 Company

366 Address

367 City

368 State

369 Zip

370 Fax

371 Phone

372 E-mail

373 Other

374 Comments

375 Name

376 Title

377 Company

378 Address

379 City

380 State

381 Zip

382 Fax

383 Phone

384 E-mail

385 Other

386 Comments

387 Name

388 Title

389 Company

390 Address

391 City

392 State

393 Zip

394 Fax

395 Phone

396 E-mail

397 Other

398 Comments

399 Name

400 Title

401 Company

402 Address

403 City

404 State

405 Zip

406 Fax

407 Phone

408 E-mail

409 Other

410 Comments

411 Name

412 Title

413 Company

414 Address

415 City

416 State

417 Zip

418 Fax

419 Phone

420 E-mail

421 Other

422 Comments

423 Name

424 Title

425 Company

426 Address

427 City

428 State

429 Zip

430 Fax

431 Phone

432 E-mail

433 Other

434 Comments

435 Name

436 Title

437 Company

438 Address

439 City

440 State

441 Zip

442 Fax

443 Phone

444 E-mail

445 Other

446 Comments

447 Name

448 Title

449 Company

450 Address

451 City

452 State

453 Zip

454 Fax

455 Phone

456 E-mail

457 Other

458 Comments

459 Name

460 Title

461 Company

462 Address

463 City

464 State

465 Zip

466 Fax

467 Phone

468 E-mail

469 Other

470 Comments

471 Name

472 Title

473 Company

474 Address

475 City

476 State

477 Zip

478 Fax

479 Phone

480 E-mail

481 Other

482 Comments

483 Name

484 Title

485 Company

486 Address

487 City

488 State

489 Zip

490 Fax

491 Phone

492 E-mail

493 Other

494 Comments

495 Name

496 Title

497 Company

498 Address

499 City

500 State

501 Zip

502 Fax

503 Phone

504 E-mail

505 Other

506 Comments

507 Name

508 Title

509 Company

510 Address

511 City

512 State

513 Zip

514 Fax

515 Phone

516 E-mail

517 Other

518 Comments

519 Name

520 Title

521 Company

522 Address

523 City

524 State

525 Zip

526 Fax

527 Phone

528 E-mail

529 Other

530 Comments

531 Name

532 Title

533 Company

534 Address

535 City

536 State

537 Zip

538 Fax

539 Phone

540 E-mail

541 Other

542 Comments

543 Name

544 Title

545 Company

546 Address

547 City

548 State

549 Zip

550 Fax

551 Phone

552 E-mail

553 Other

554 Comments

555 Name

556 Title

557 Company

558 Address

559 City

560 State

561 Zip

562 Fax

563 Phone

564 E-mail

565 Other

566 Comments

567 Name

568 Title

569 Company

570 Address

571 City

572 State

573 Zip

574 Fax

575 Phone

576 E-mail

577 Other

578 Comments

579 Name

580 Title

581 Company

582 Address

583 City

584 State

585 Zip

586 Fax

587 Phone

588 E-mail

589 Other

590 Comments

591 Name

592 Title

593 Company

594 Address

595 City

596 State

597 Zip

598 Fax

599 Phone

600 E-mail

601 Other

602 Comments

603 Name

604 Title

605 Company

606 Address

607 City

608 State

609 Zip

610 Fax

611 Phone

612 E-mail

613 Other

614 Comments

615 Name

616 Title

617 Company

618 Address

619 City

620 State

621 Zip

622 Fax

623 Phone

624 E-mail

625 Other

626 Comments

627 Name

628 Title

629 Company

630 Address

631 City

632 State

633 Zip

634 Fax

635 Phone

636 E-mail

637 Other

638 Comments

639 Name

640 Title

641 Company

642 Address

643 City

644 State

645 Zip

646 Fax

647 Phone

648 E-mail

649 Other

650 Comments

651 Name

652 Title

653 Company

654 Address

655 City

656 State

657 Zip

658 Fax

659 Phone

660 E-mail

661 Other

662 Comments

663 Name

664 Title

665 Company

666 Address

667 City

668 State

669 Zip

670 Fax

671 Phone

672 E-mail

673 Other

674 Comments

675 Name

676 Title

677 Company

678 Address

679 City

680 State

681 Zip

682 Fax

683 Phone

684 E-mail

685 Other

686 Comments

687 Name

688 Title

689 Company

690 Address

691 City

692 State

693 Zip

694 Fax

695 Phone

696 E-mail

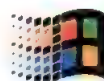
IT'S NOT IN THE WHEN

Windows® 95 and Windows™ NT Workstation put the power of a server on a PC. New Back-UPS Pro® will keep it there...

"...TO TAKE ADVANTAGE OF WINDOWS 95'S SYSTEM AGENT AND DRIVESPACE ULTRACOMPRESSION—GRACEFUL SHUTDOWN IN THE EVENT OF AN EXTENDED POWER OUTAGE HAS BECOME INCREASINGLY IMPORTANT. APC'S PLUG AND PLAY BACK-UPS PRO 280... IS ONE SLICK PACKAGE." PC COMPUTING

"[WITH WINDOWS 95]...USERS ARE KEEPING MORE FILES OPEN AT ONCE AND HAVE MORE DATA AT RISK THAN EVER BEFORE... A UPS IS QUICKLY BECOMING A MUST..."
COMPUTERLIFE

"A UPS WILL PROTECT OUR DATA IN THE EVENT OF A POWER FAILURE. IT MAY SEEM LIKE OVERKILL, BUT FOR ANY PC TODAY—ESPECIALLY IF YOU RUN YOUR BUSINESS ON IT—ITS AN INDISPENSIBLE PERIPHERAL." PC MAGAZINE



MICROSOFT
WINDOWS NT
COMPATIBLE

If you're about to invest in a new multi-tasking operating system like Windows 95 or Windows NT Workstation, experts say it may be time to invest in APC protection. Why? Because bad power is the largest single cause of data loss, and on a multi-tasking system your vulnerability is multiplied. When full protection is as affordable as a new mouse, it just doesn't make sense to leave your premium machine unprotected.

Safe Automatic Shutdown
Safe automatic shutdown of operating system and Microsoft Office with the new WorkSafe™ feature. Also a power event log for diagnostics, a real-time display of UPS status, and certified Windows 95 Plug & Play and Windows NT for Workstation compatibility for easy installation.

Microsoft Windows 95 Upgrade

Back-UPS Pro
280

APC
AMERICAN POWER CONVERSION

"ORGANIZATIONS CAN FURTHER ENSURE RELIABLE SYSTEM PERFORMANCE BY CHOOSING A UPS LICENSED TO BEAR THE DESIGNED FOR WINDOWS 95 LOGO..." MICROSOFT

"DON'T TAKE CHANCES. GET THE ULTIMATE PROTECTION... FROM APC." PCWORLD

20 BEST UPS
PC
W
VESDA BARDS
EYE

Protect against the inevitable power hit with new Back-UPS Pro, the one and only UPS "Designed for Windows 95." Back-UPS Pro also offers seamless Windows NT Workstation compatibility. Automatic Voltage Regulation (AVR) provides complete protection against extended brownouts or overvoltages, without battery drain. CellGuard™ intelligent battery management extends battery life with fast recharge and deep discharge protection. The units even include built-in 10Base-T network cable/phone line surge protection: Back-UPS Pro is designed for 100% protection, backed by a \$25,000 guarantee against equipment surge damage (see policy for details). According to PC Week, APC is preferred five to one over its closest competitor. No wonder APC protects more PC's than all other UPS vendors combined.

For 6 minutes of runtime on a typical 486, choose BU Pro 280PNP. For Pentiums or more runtime, choose the BU Pro 420PNP or 650PNP. For a Free Demo Disk, and 68-page catalog, call toll free, or visit our PowerPage™ at <http://www.apcc.com>

SURGEARREST™ & PROTECTNET™
AC and dataline surge suppressors.



STARTING AT \$19

BACK-UPS® & BACK-UPS® Pro
UPS for PC and advanced workstations



STARTING AT \$119

SMART-UPS® & SMART-UPS® v/s
Manageable UPS for servers and networks



STARTING AT \$299

MATRIX-UPS® & ACCESSORIES
Modular UPS for client/server datacenters



STARTING AT \$3499

APC®

AMERICAN POWER CONVERSION
1-800-BUY-APCC ext. 7028
Dept. E4

401-788-2797 fax / 800-347-FAXX PowerFax™

132 Fairgrounds Rd., W. Kingston RI 02892 USA

CIRCLE 887 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)



SUBSCRIPTION SALE

Answers. Advice. Strategies. Solutions.
22 times a year, you get it all
from PC MAGAZINE.

To reserve big savings,
call toll-free:

1-800-289-0429

BONUS:

Free CD-ROM with your
paid subscription!

Special
One-Year
Price

CALL NOW
FOR BIG
SAVINGS

Annual
Newsstand
Price

~~\$86.10~~

Regular
Subscription
Price

~~\$46.97~~

Network Edition Advertisers Index

Reader Service No.	Advertiser Telephone / Web Address	Page
875	Adobe Systems Inc. 800-833-6687 / http://www.adobe.com	NE28
915	American Power Conversion 800-800-4272 / http://www.apcc.com	NE22-NE23
887	American Power Conversion 800-800-4272 / http://www.apcc.com	NE36
858	Artisoft Inc. 800-233-5564 / http://www.artisoft.com	NE6
*	Attachmate 1(800) 427-6283 / http://www.attachmate.com	NE35
898	BayNetworks, Inc. 800-BAYNET	NE11
900	Citrix 800-437-7503 / http://www.citrix.com	NE29
*	Dell Computer Corporation 800-289-3355 / http://www.dell.com	NE15
926	Hayes Microcomputer Products..... 800-374-8388 / http://www.hayes.com	NE31
*	IBM Corporation.....	NE12-NE13
895	Insignia Solutions 800-848-7677 / http://www.insignia.com	NE33
859	Kingston Technology.....	NE32

Reader Service No.	Advertiser Telephone / Web Address	Page
	800-435-42620 / http://www.kingston.com	
924	Micron Electronics..... 800-438-3343 / http://www.micron.com	NE2-NE3
925	Micron Electronics..... 800-438-3343 / http://www.micron.com	NE34
877	NetManage, Inc..... 800-973-7171 / http://www.netmanage.com	NE17
*	Novell, Inc..... 800-453-1267 / http://www.novell.com	NE8-NE9
*	Oracle Corp..... 800-633-0518 / http://www.oracle.com	NE5
873	Powersoft 800-438-3343 / http://www.micron.com	NE24
871	Seagate Technologies..... http://www.seagate.com	NE18-NE19
879	Seagate Technologies 800-234-1793	NE27
909	Standard Microsystems Corp..... 800-SMC-4-YOU / http://www.smc.com	NE21

*No Reader Service#. Please Call Advertiser For Information.

For Network Edition information, use Reader Service Card located in the back of the book.

INSTANT Gratification.com

FREE
DEMO



GO TO PC MAGAZINE BUYERLINK AT WWW.PCMAG.COM/BUYERLINK

 *Want to learn more* about a particular company or product, but just don't feel like waiting for the U.S. Postal Service?

Then check out BuyerLink, a new reader service available only from PC Magazine. Just go to the web site (www.pcmag.com/buyerlink) listed at the bottom of each participating advertiser's ad, and you can instantly request valuable product and company information, as well as hotlink directly to a vendor's web site.

PC Magazine BuyerLink. It's the online service you've been waiting for.



THE
BENCHMARK

THERE IS A VOICE INSIDE YOU THAT QUESTIONS
STATUS QUO.

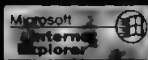
AND YEARNS TO ABANDON THE WAYS
OF TRADITIONAL THINKING.

IT URGES YOU NOT TO BE CONTROLLED BY
YOUR ENVIRONMENT. BUT RATHER,

LET THE ENVIRONMENT ADAPT TO YOU.

THE VOICE INSIDE WHISPERS
FOR YOU TO START DOING EXTRAORDINARY THINGS.

START
DOING
EXTRAORDINARY
THINGS



"Start Doing Extraordinary Things" and Livegear are trademarks and TravelMate is a registered trademark of Texas Instruments. Pentium and the Intel Inside logo are registered trademarks of Intel Corp. The Genuine Microsoft Products logo is a trademark and Microsoft, Windows and the Windows logo are registered trademarks of Microsoft Corp. © 1996 TI.



TRAVELMATE 6000 SERIES

- Weight: 5.9 lbs. with floppy
- 6-way modular bay with floppy & optional 6X CD-ROM, high capacity diskette drive, 2nd Lithium ion battery, 2nd HDD, weight reduction module
- Energy-saving, super high aperture TFT screen
- Zoomed Video port
- 120, 133 or new 160MHz Pentium® processor with PCI bus (internal and external)

To prevent circumstances or surroundings from getting in your way, we created the new TravelMate® 6000 series. An unprecedented 6-way modular bay delivers optimum storage and memory capabilities,

thus offering greater flexibility to work when and where you choose. With a trim 5.9 lb. frame illuminated by a noticeably brighter, more energy-efficient screen, it's ideally suited to even the most unusual locations. The TravelMate 6000 series is also fully supported by our new line of livegear™ accessories, including a wide range of optional docking stations.



All told, it's the perfect opportunity to do something highly out of the ordinary.



pentium®
PROCESSOR

1-800-TI-TEXAS E-mail: 2ti@msg.ti.com

Internet: <http://www.ti.com/notebook>

CIRCLE 353 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/BuyerLink

 **TEXAS
INSTRUMENTS**

BROWSERS

By Michael J. Miller, Thomas Moore, and Amarendra Singh

- 1 The Navigator platform sets the standard for scripting, plug-ins, Java, and browser programmability.
- 2 Navigator's whiteboard and Internet phone let remote conferers sketch things out over the Internet.
- 3 Netscape Mail underscores the importance of e-mail, the Internet's biggest application.
- 4 ActiveX development brings a powerful new programming standard to the Web.
- 5 Mail and news clients are recent additions to Microsoft's browser.
- 6 Internet phones and application sharing are high points of Internet Explorer 3.0's strong collaboration tools.



AT THE CROSSROADS



Netscape Navigator 3.0 defines the browser. Microsoft Internet Explorer 3.0 clones its features and adds significant new technology. The winner will dictate the future of the Web.

The battle of the browsers has quickly come down to a duel. Of the 30 products covered in our last Web browser review ("Just Browsing," March 12, 1996), only two seem to matter anymore. Netscape Navigator remains the overwhelming market leader, the product most people think of as synonymous with Web browsing. It defines the Web's de facto standards for HyperText Markup Language (HTML), graphics, plug-ins, Java, and scripting. Almost all Web content that isn't vanilla is flavored for use with Navigator. The latest release, Navigator 3.0, adds collaboration features,



Join Us Online

as PC Magazine editors
and representatives from
Microsoft and Netscape answer
your questions about the current
and future state of browsers.

www.pcmag.com

IN THIS STORY

End-User Features	105
Webmaster Features	112
Developer Platforms	119
Performance Tests	129
Collaboration Tools	130
Mail and News	139

multimedia, VRML support, and improved Internet mail and news.

Microsoft Internet Explorer 3.0 is the first version of Microsoft's browser that is truly competitive. The new Windows 95 and Windows NT releases not only match up well with Netscape's HTML, plug-ins, Java environment, and scripting standards; they also add support for ActiveX, a technology for bringing Windows-style applications to the Web. Internet Explorer also matches or exceeds Netscape's offerings in collaboration tools, multimedia, VRML, mail, and news. Microsoft is giving its browser and development tools away for free (Netscape Navigator sells for \$49) and

has concluded aggressive bundling deals with several of the largest online services and Internet service providers. Today, Internet Explorer's market share hovers around 10 percent, but it is sure to grow.

Which browser should you use? The choice may seem trivial, but it has enormous implications. The company that dominates the browser market will dictate online standards and change the way we use the Web.

To help you choose—and understand the implications of your choice—we provide in-depth analyses of both browsers from the perspectives of the end user, the Webmaster, and the applications developer. We also look at the performance of each browser's HTML- and graphics-rendering engine, test each browser's collaboration tools, and compare the pair's respective mail and news features. A companion piece in this issue, "Java Speed Trials," gives detailed test results involving both browsers' Java environments.

Given that Internet Ex-

plorer comes out ahead in many of these comparisons, you may be surprised that Netscape Navigator is our Editors' Choice. Our decision rests on the fact that Navigator is still the best tool for accessing the huge number of Navigator-enhanced sites on today's Web. Internet Explorer is in many ways a technically superior product, however, and Netscape will have to work hard to keep its lead. Neither browser displays the kind of rock-solid stability we expect from other software, a legacy of the frantic pace of Web development. While we will see incremental upgrades to the current versions, both vendors are al-

ready working on their next major releases, expected as early as this fall.

IT'S A NETSCAPE WEB

In theory, the Web is based on open standards. In practice, an enormous amount of Web content is tailored to leverage proprietary features in Netscape Navigator browsers. These features cover almost every aspect of content delivery.

Netscape extensions to HTML are widely used by page designers who want better formatting control and more display options than what vanilla HTML provides. Plug-ins, another important Netscape standard, give vendors a way to add almost any conceivable functionality to the Navigator browser—everything from streaming audio broadcasts to multimedia. JavaScript, Netscape's widely used scripting language, gives Web developers a way to embed small but highly useful programs into their pages. JavaScript can be used to manipulate programmable elements of the

Netscape browser and the documents it displays.

With the exception of the Netscape HTML extensions, none of these technologies are true standards, and many are undocumented. These proprietary technologies give Netscape enormous leverage, letting it steer the direction of Web development and lock out potential competitors.

MICROSOFT: CLONE MAKER

No company has understood the power of Netscape's "monopoly" better than Microsoft. (Cynics might observe that Microsoft has long enjoyed comparable control over the Windows platform.) Rather than fighting established standards, Microsoft Internet Explorer 3.0 offers a clone of the Netscape platform. It provides a plug-in runtime environment, supports JavaScript (which Microsoft calls JScript), and exposes the equivalent of Navigator Objects.

Unfortunately, the clone is

WEB BROWSERS

BROWSER FEATURES
THAT DRIVE THE WEB

WEB NAVIGATION has only gotten easier, thanks to both browsers' clean interface design. Internet Explorer comes out ahead on interface customization, while Netscape Navigator offers better options for low-bandwidth users.

HTML standards drive the look of the Web. Internet Explorer's adoption of the powerful Cascading Style Sheets Level 1 standard will give Webmasters typographic control they've never had before, but Netscape Navigator is the faster of the two at actually rendering pages.

VIRTUAL REALITY, in the form of VRML, is available through both browsers. Both also support in-line audio. Internet Explorer goes one step further with ActiveMovie, a native video playback module that handles multiple formats.

JAVA AND PLUG-INS remain the accepted standards for extending browser functionality. Both browsers support them, although Internet Explorer's plug-in support is less than perfect. Microsoft's ActiveX technology is a powerful alternative.

COLLABORATION TOOLS, including an Internet telephone, remote whiteboard, and chat, are standard features of both browsers. Internet Explorer also offers application sharing, a powerful feature for linking remote coworkers.

Editors' Choice

• Netscape Navigator 3.0



The true winner of the browser wars is the one who uses both Netscape Navigator 3.0 and Microsoft Internet

Explorer 3.0 to access the Web. Together, these tools will give you far more of the Internet than either one can alone. But if you're limited to a single browser, Netscape Navigator 3.0, the world's most popular and influential browser application, is still the best choice. Too many Web sites are optimized for Navigator plug-ins and JavaScript features that Internet Explorer, Navigator's only real competitor, does not yet fully support.

Navigator 3.0's platform-independent philosophy has taken it to important host environments including Macintosh and Unix—places where Internet Explorer 3.0 has yet to go. Navigator's newly introduced LiveConnect standard, which integrates Java, JavaScript, and plug-ins, will be particularly attractive to Web developers who want to reach the largest possible audience on all platforms. Its topflight HTML-rendering performance and flexible options for low-bandwidth use deliver your pages more quickly at all connection speeds.

not 100 percent compatible. A few plug-ins (mostly obscure ones) don't work, some JavaScript pages break, and a handful of objects are unsupported. We expect Microsoft will fix these problems soon. But until then, it's hard to recommend Internet Explorer as your sole browser.

Internet Explorer also offers more than its share of original new technology. Most of this, too, is proprietary, although it's arguably better documented and more accessible to third parties than what Netscape offers. The most significant new technology is ActiveX, a direct descendant of Microsoft's OCX control standard that is ultimately based on Microsoft's Component Object Model (COM). ActiveX is currently a 32-bit Windows-only affair, although Microsoft is porting it to Unix and the Mac. There are already about 1,000 ActiveX controls on the market, and the standard is already widely supported by third-party programming tools.

ActiveX competes with both plug-ins and Java in the sense that it can be downloaded on the fly to add rich functionality to the browser. It is also complementary with both in that ActiveX, Java, and plug-ins can be used within Internet Explorer as components to build total solutions. Used in

conjunction with JScript or Visual Basic Scripting Editor (VBScript), ActiveX technology makes it possible to develop highly complex Web applications quickly and easily. It is unlikely to be widely adopted on the Web until Internet Explorer achieves a significant market share. But for intranet developers (in 32-bit Windows environments), this represents a very compelling approach.

Both browsers support Java applets and provide Java just-in-time (JIT) compilers for accelerating Java execution. This support cements Java's position as a central Web development tool. Overall, Microsoft's Java environment is more stable and far faster than Netscape's.

WEB COLLABORATION

Both Internet Explorer and Navigator include tool suites designed to let workgroups collaborate across the Internet. Although these tools are relatively basic, this is a striking trend. Both browsers include

Navigator still has a hard fight ahead to stay number one. Needed improvements we hope to see in the near future include support for rich style sheets, better stability and speed in its Java environment, and a substantially beefed-up collaboration suite.

Internet Explorer 3.0 will wake up anyone who still doubts Microsoft's commitment to the Web. In just over a year, the company has transformed Internet Explorer from a flimsy me-too affair into a solidly engineered platform for cutting-edge Web content and applications.

End users will enjoy Internet Explorer's highly customizable user interface, easy navigation features, and powerful collaboration tools. Webmasters will appreciate its strong HTML implementation and welcome its pioneering adoption of HTML Cascading Style Sheets, a powerful feature based on a proposed W3C standard that brings basic typographic control to page design for the first time.

Developers in 32-bit Windows environments will welcome the ease and power of ActiveX, an OLE-based standard already widely supported by third-party control and tool vendors. Microsoft's integration of Java, JavaScript, and plug-ins into the ActiveX model is particularly impressive. Java developers will welcome Internet Explorer's well-tuned Java virtual machine, the fastest currently available.

The strikes against Internet Explorer are incompatibilities in its plug-in and JavaScript support and the fact that Windows 3.x, Macintosh, and Unix users are left out in the cold. When Microsoft remedies these deficiencies—and it has committed itself to doing so—Internet Explorer will be a tough browser to beat.

point-to-point Internet telephones, which let you talk to other users anywhere in the world over an Internet connection (and without long-distance charges). They also offer whiteboard modules for free-form group brainstorming and text-based chat modules for real-time group discussions. Internet Explorer's collaboration suite also includes a powerful remote application-sharing feature that lets co-workers view and coedit documents in any Windows application in real time across the Internet.

Both browsers include mail and Usenet news clients as well. These applications aren't exactly knockouts, but all are functional and will get you started with these core Internet applications.

As competition between Microsoft and Netscape heats up, one certainty is that each vendor sees its browser as the key to implementing its vision for the Web. The contest to deliver the fastest, richest, most stable, and most compatible browser can only benefit Web users.

Our Contributors: MICHAEL J. MILLER is editor-in-chief of *PC Magazine*. JOHN CLYMAN and AMARENDRA SINGH are senior technical editors at PC Magazine Online. LARRY SELTZER is a technical director at PC Magazine Labs. JAN OZER is president of Doceo Publishing, a developer of digital video testing tools. THOMAS MACE was the senior editor in charge of this story, and JAY MUNRO was the project leader.

Increase Your Scanner's Accuracy*



Accuracy at a cost that can't be beat.
— Home PC
June 1996
Editor's Choice

X Imagine finding professional OCR scanning software that can handle documents containing multiple columns, pictures or cell tables with ease. Xerox' full-featured TextBridge Pro 96 will not only save you from retyping your documents, but the hassle of reformatting them as well.

TextBridge Pro 96 provides exceptional accuracy on various document types including magazines, dot matrix, faxes and photocopies. Newspaper columns with pictures are output as if you retyped them yourself — all at the touch of one button.

Scan to the Web

Now take your scanned in documents and convert them into HTML files. TextBridge Pro 96 includes SoftQuad's HoTMetal light 2.0, giving you an easy-to-use, one step solution for scanning, recognizing and

FREE
The Package Includes
SoftQuad
HoTMetal light
2.0 Web Publisher by SoftQuad



editing paper-based information bound for the World Wide Web. It can even help you build your Intranet.

And that's not all, TextBridge Pro 96 is backed by the Xerox Satisfaction Guarantee which includes unlimited toll free support*, plus a thirty day risk-free offer.

To learn more call us, visit our Web site, or see us on CompuServe at Go TextBridge. We'll help you dramatically increase the accuracy of your scanner, with TextBridge Pro 96.

To order call:
1-800-248-6550, ext. 3

Visit our Web site:
www.xerox.com/products/tbpro

THE DOCUMENT COMPANY
XEROX

In Canada 1-800-275-9376



*For registered users *Manufacturer's suggested retail price. No proof of purchase required. Actual price may vary. Xerox®, The Document Company®, the stylized X, and TextBridge® are trademarks of Xerox Corporation. *When compared to the original OCR software initially bundled with your scanner.

CIRCLE 163 ON READER SERVICE CARD

END-USER FEATURES

Internet Explorer stresses a Windows look and feel, while Netscape Navigator is remarkably similar across all the platforms it runs on. Both browsers' interfaces stand up well to intense scrutiny.

By Amarendra Singh

Thanks to NCSA Mosaic, the Web browser pioneer, today's browsers have ingeniously simple interfaces and look more alike than different—at least on the surface. Once you look into the details, you'll find many differences that affect their power, configurability, and ease of use.

Netscape Navigator 3.0's interface will look familiar to old Navigator hands, as the basic paradigm has remained unchanged since Version 2.0. You can still set Navigator's main toolbar buttons to display themselves as icons, text, or icons with text, and a second row of buttons gives you fast access to several useful Netscape-sponsored Web sites. You can't customize the URLs associated with these buttons. You can choose to show or hide either of these two rows or the URL location window.

Internet Explorer 3.0 offers a significant number of highly visible enhancements over its previous release. The biggest is in Internet Explorer's three-tiered toolbar, which you can collapse into two rows or a single row by dragging. This lets you substantially increase your screen real estate while keeping easy access to the toolbar items you might want. The Links tier shows a set of useful links; you can customize their URLs. On the whole, the toolbars in Internet Explorer are more flexible than those in Navigator.

Navigator's bookmarks are a step ahead of the Favorites list in Internet Explorer, and its tools for managing bookmarks are much easier to use. Navigator can also check for updates to all or some of your bookmarked pages since you last

visited them. You can import bookmarks into Navigator from any HTML file, and you can insert separators between bookmark entries to help make long lists more readable.

Navigator also gives you detailed information on the last time a bookmark was accessed. Both Internet

Explorer and Navigator let you track your link history by color-coding links to visited sites.

Web browsers are notorious for filling your hard disk with cached pages. Both Internet Explorer and Navigator let you delete your page cache, set the maximum percentage of your hard disk the cache can occupy, and specify how often to check sites to see if cached pages have been updated. Navigator also maintains a memory cache (which you can clear), while Internet Explorer relies on native Windows caching.

Users who have a tough time remembering passwords will be happy with a feature that lets Internet Explorer store user names and passwords for sites that require it. And those who prefer the keyboard over the mouse can use the Tab key to jump from link to link on a page. For its part, Netscape has added backward/forward navigation to the browser pane's right-click menu, letting you jump from page to page without having to move the mouse cursor to the main toolbar.

Users on slow connections will appreciate the fact that Navigator lets you disable autoloading of images yet still lets you download images for any pages you want to see in detail. Internet Explorer lets you disable image loading, but you can't override the setting on a page-by-

page basis. Internet Explorer provides ToolTips (derived from the alternative text tag) that are displayed when your mouse cursor hovers over an image. ToolTips for the Back and Forward buttons specify the pages you will move to.

For those concerned with shielding children or other users from some categories of Web content, Internet Explorer supports the Recreational Software Advisory Council rating scheme for Web sites. This lets site designers rate their own content on a five-degree scale in such categories as profanity, sexual content, and violence. You need to supply a password to access areas that exceed the specified levels. Self-imposed ratings may not provide an ideal solution, but you can configure the browser to block any site that has not been rated. More generally, Internet Explorer supports the PICS (Platform for Internet Content Specification) standard, which allows for the incorporation of future rating schemes.

With its huge installed base, Navigator has established a number of small conventions as to how Web browsers behave, some of which Explorer has mimicked. In

END-USER FEATURES		
		
Good	Navigation	Excellent
Excellent	Low-bandwidth support	Fair
Excellent	Bookmarks	Good
Good	Multimedia	Excellent
Good	Security	Excellent
Excellent	Download and installation	Good

The **navigation** rating reflects the power, ease of use, and configurability of menus, command buttons, and right-click context menus. **Low-bandwidth support** covers features designed to optimize browsing over slow connections. **Bookmarks** covers the creation, display, management, and updating of bookmarks. **Multimedia** covers the browser's built-in support for audio, video, and VRML files. **Security** covers the browser's ability to support secure transactions on the Web and to verify the security of downloaded executable code. **Download and installation** covers the packaging of downloadable installation files, the availability of different downloading options, and the smoothness and flexibility of the installation process.

FINALLY, A LINE OF MULTIMEDIA
PEOPLE WHO KNOW THAT MONEY



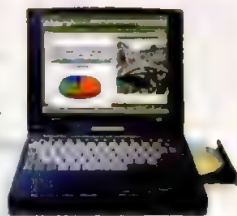
* Estimated street price. All other trademarks are the property of their respective owners. © 1996 Olmsted Personal Computers USA, Inc. All rights reserved.

MEDIA NOTEBOOKS FOR DOES NOT GROW ON TREES.

Echos P100C

100MHz Pentium processor, 8MB std./40MB max RAM, 11.3" DSVN display,
PCI Bus, 256K L2 cache, 1.3GB removable HDD, 800x600 SVGA resolution,
Multi-function bay: 6X CD-ROM and modular FDD (std.), second battery (opt.)

\$2,299*



Echos P100E

100MHz Pentium processor, 8MB std./40MB max RAM, 10.4" TFT display,
PCI Bus, 256K L2 cache, 1.3GB removable HDD, 800x600 SVGA resolution,
Multi-function bay: 6X CD-ROM and modular FDD (std.), second battery (opt.)

\$2,799*



Echos P120E

120MHz Pentium processor, 8MB std./40MB max RAM, 11.3" TFT display,
PCI Bus, 256K L2 cache, 1.3GB removable HDD, 800x600 SVGA resolution,
Multi-function bay: 6X CD-ROM and modular FDD (std.), second battery (opt.)

\$3,599*



Echos P133S

133MHz Pentium processor, 16MB std./40MB max RAM, 11.8" TFT display,
PCI Bus, 256K L2 cache, 1.3GB removable HDD, 800x600 SVGA resolution,
Multi-function bay: 6X CD-ROM and modular FDD (std.), second battery (opt.)

\$4,599*



In 1965 we invented the world's first desktop computer. And over the last 30 years Olivetti has grown into one of Europe's top PC manufacturers. Now we're proud to introduce an award-winning line of powerful and truly affordable multimedia notebooks to the U.S., the Echos series from Olivetti. Notebooks with the ideal combination of performance and value without sacrifice. From the company determined to be your best choice. For more information, call Olivetti toll-free at 1-888-465-4838, or visit www.olivetti.com

olivetti
personal computers

Due This Fall: The Next Browser Generation

By Amarendra Singh

Even as they ship final versions of Navigator 3.0 and Explorer 3.0, Netscape and Microsoft are hard at work on their next browser releases. Both may be available in beta as early as this fall. Microsoft provided us with a fair amount of detail concerning its upcoming Internet Explorer 4.0 and let us work with an alpha version. Netscape revealed less about Galileo, its next-generation browser, but gave us some indications of its design goals.

GALILEO

Netscape's plans for Galileo concentrate on the Web client as a vehicle for communication and collaboration. The company foresees a melding of group scheduling, discussion, and calendaring features from its Collabra Share product line into Netscape's client and server products.

Much of this enhanced functionality will hinge on added support for IMAP4 (the emerging Internet Mail Protocol); LDAP (Lightweight Directory Access Protocol), the Netscape-supported open directory structure; and S/MIME (Secure MIME), which will extend encryption and authentication to e-mail. Netscape also plans to bring full WYSIWYG HTML editing capability to both its mail and news clients—no surprise, given the HTML viewing

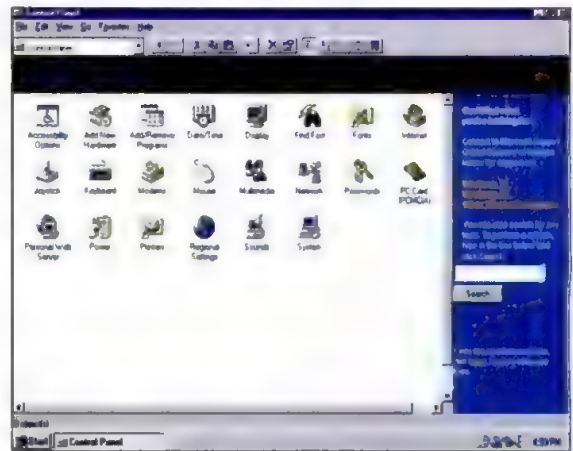
support already implemented in the Navigator 3.0 versions. Netscape also plans to integrate real-time chat and audio collaboration directly into the browser. The aim is to produce a client that brings Notes-like functionality to corporate intranets and public servers on the Web.

On the HTML front, Netscape has said that it will support stylesheets but has not indicated which implementation it will adopt. With Microsoft putting considerable effort behind one particular set of CSS Level 1.0 and 2.0 draft specifications, any contrary move by Netscape will cause confusion. We can also expect to see additional HTML tags aimed at both page layout and object embedding. To counter the functionality provided by Microsoft's ActiveX controls and VBScript, Netscape will deliver additional Java classes and JavaScript enhancements.

EXPLORER 4.0

Rather than greatly expand the functionality of the browser itself, Microsoft's Internet Explorer 4.0 aims

to integrate Internet and local content into a single user interface. In essence, Internet Explorer 4.0 is a fusion of Windows Explorer and Internet Explorer that will give you a unified HTML-based view of the Web, your local system, and your network. Every view you now have of individual folders or the desktop will be augmented by an additional Web view. This will be true of all Explorer views, including the Con-



Internet Explorer 4.0's Web view of the Control Panel. The frame on the right shows an associated HTML help text.

trol Panel and the Windows 95 Desktop.

Much of the new interface functionality will be based on ActiveX. The Web view pane itself is an updated List-View control. It can contain other controls that show such objects as folders. The overall visual effect and behavior will be much like those of today's Windows 95 Explorer.

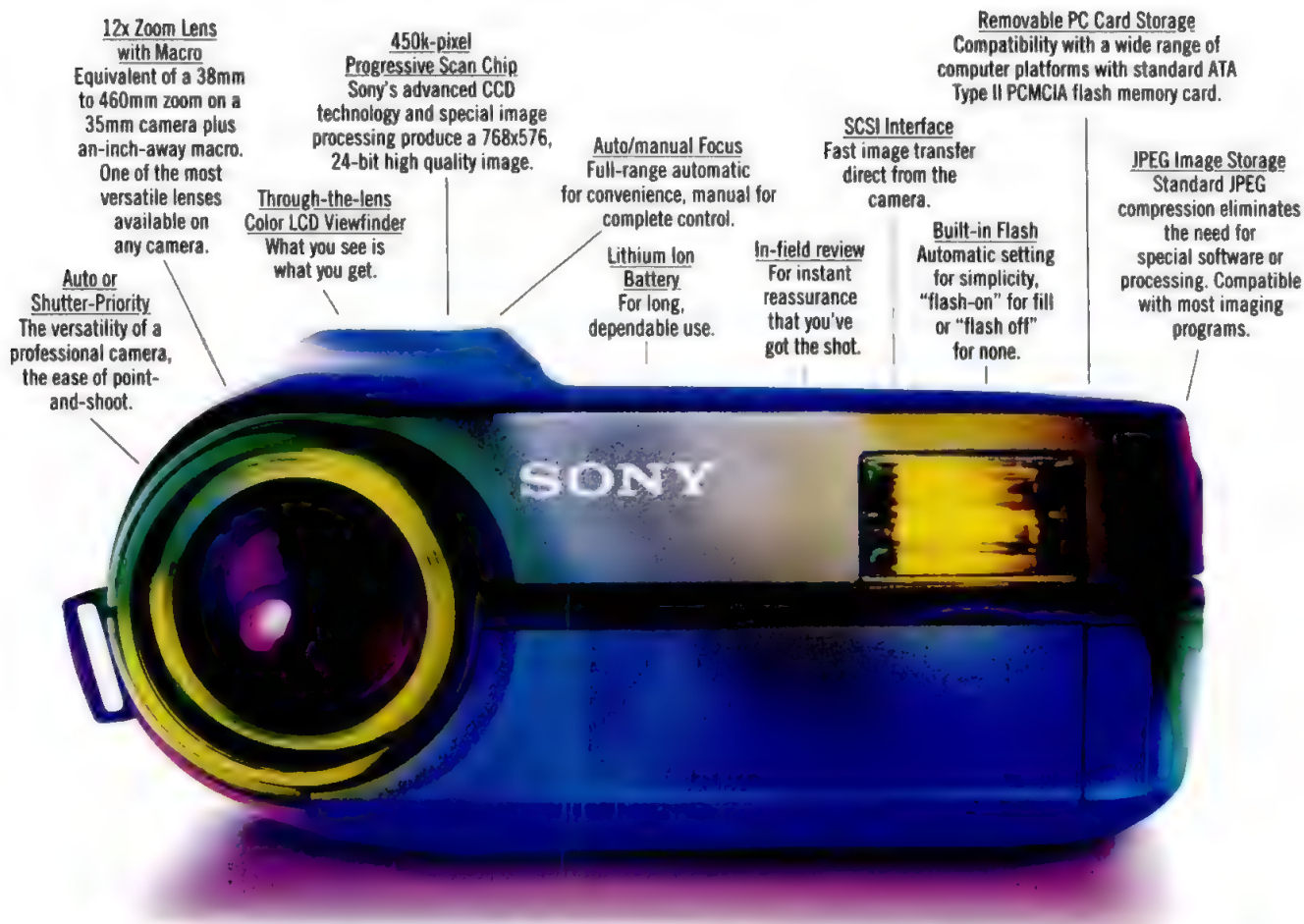
There are differences, however. Forward and Back buttons will let you use Web-style navigation, whether you're looking at a Web site or your hard disk. A right-hand panel of the Web view can contain an HTML frame with text based on standard templates describing the contents of a particular directory. This is a potentially useful feature for network files, where the directory structure or contents may need some explaining. Since the Windows desktop itself has become an ActiveX container (called the Active Desktop), you will be able to place interesting functional elements on it, such as an Internet news ticker.

Web sites will be able to post a contents file that will let Internet Explorer display the site hierarchy as though it were a local directory structure. Other slated features include offline browsing capabilities and Favorites icons, which indicate when the marked page has changed.



In Internet Explorer 4.0, Web sites will be integrated into the same hierarchy tree as local and network files.

How To Load A Camera.



Introducing The Portable Digital Still Camera That's Loaded With Features, Not Film.

From the people who started the concept of filmless photography comes the state-of-the-art portable digital camera: the DKC-ID1.



It combines the creative control and professional features found in sophisticated film cameras with the immediacy of digital imaging. Digital photography means rapid turnaround, quick return on your investment and a complete digital record. It's easy and immediate. You capture high quality, color-accurate images, then edit, retouch, present, publish or transmit them right from your computer.

For more information on picture perfect convenience and quality at a price you can afford call 1-800-472-SONY, ext. ID1 or visit our Web site at <http://www.sel.sony.com/SEL/bppg/>.

SONY

Browsers at the Crossroads

both browsers, for example, Ctrl-D adds the current page to the bookmarks, and Ctrl-B will open the bookmark folder. In some instances, Microsoft has stayed with Windows conventions, one example being the use of F5 for refreshing a screen.

MULTIMEDIA AND VRML

Both Internet Explorer and Navigator provide in-line support for a variety of audio and video formats. Navigator's LiveAudio and LiveVideo deliver .AU, AIFF, MIDI, and .WAV audio and .AVI and QuickTime video. Internet Explorer's ActiveMovie control supports all those formats, plus MPEG. It also supports a pseudo-streaming feature that allows audio and video playback to begin before a full file has been downloaded.

Both browsers give you the ability to view VRML files within the browser window. Microsoft's viewer is licensed from Intervista Corp., and Netscape acquired its Live3D VRML technology last year. Microsoft has announced a licensing agreement with DimensionX to use its Liquid Reality VRML technology in future versions of Internet Explorer.

We found that Internet Explorer delivers good VRML performance but is very sensitive to any errors in the VRML file. Its VRML interface and navigation controls are intuitive. While Navigator's Live3D also offers strong performance, it optimizes the rendering of a VRML file by discarding or ignoring some of the file specification and using its own simplified model. Visually, the results are far from

pleasing. Live3D is more convenient to install, as it is bundled within the complete version of Navigator, and its low sensitivity to file errors lets it execute VRML worlds that more stringent browsers reject.

For secure transactions, such as retrieving your bank balance or paying by credit card, both browsers support the same identification and encryption protocols, SSL 2.0 and 3.0 (both 40-bit and 128-bit). Microsoft also supports its own Private Communications Technology (PCT) 1.0 standard. Both Internet Explorer and Navigator let you use personal certificates, which function as digital IDs for Web transactions. Under these schemes, you apply for a certificate from third-party certificate vendors, such as VeriSign, who supply various levels of certified trust. Personal certificates let you provide information about yourself ranging from your e-mail address to your credit card number and beyond.

Internet Explorer provides an Authenticode feature, which lets suppliers of downloadable executable code (plug-ins or ActiveX controls, for example) attach certificates to their products. These certificates assure the end user that the code is from a known vendor and that it has not been altered. Navigator does not provide a comparable feature.

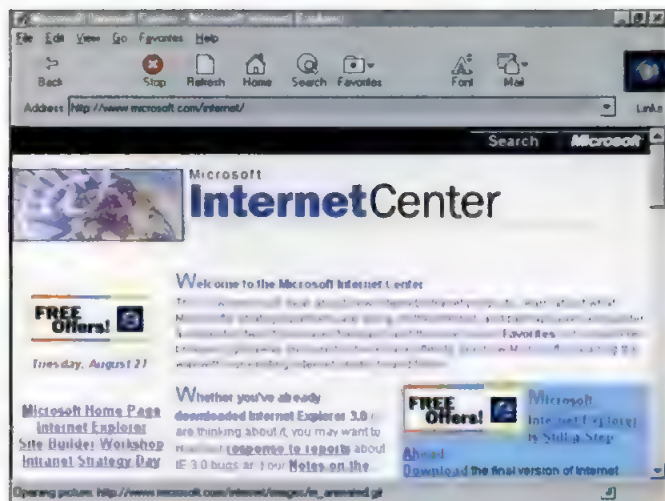
DOWNLOAD AND SETUP

Navigator is available in two downloadable versions, a complete package (5.9MB) that includes Cooltalk (1.95MB) and Live3D (1.38MB) and a reduced ver-

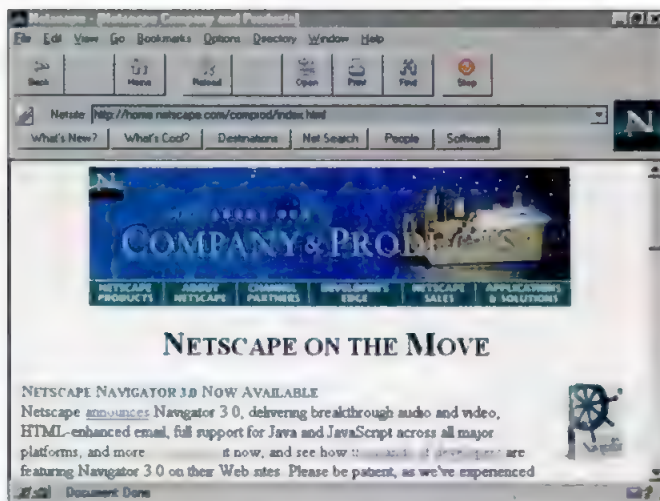
sion (3.6MB) without Cooltalk. Both include the mail and news clients. Internet Explorer is downloadable in three versions. The full installation (8MB) includes mail and news clients (980K), NetMeeting (2.3MB), ActiveMovie (600K), and the HTML layout control (1.43MB). The "typical" version includes mail and news only, and the minimum version includes only the browser. The VRML control is a separate download (1.9MB).

All these downloads are self-extracting and self-installing executable files. Microsoft's installation routine does not allow you to specify a target directory, and if you have a previous version of Internet Explorer, the installer will rename it. The Internet Explorer setup routine will automatically retrieve your Navigator bookmarks and add them to your Favorites list. Both browsers depend on Windows for the Internet connection, although both companies offer versions aimed at users who do not have an Internet access provider.

It should come as no surprise that Microsoft has taken great pains to give Internet Explorer a strong Windows look and feel. Its integration into the Windows environment goes beyond anything in Navigator, which looks, feels, and behaves remarkably the same on every platform. For Windows users, Internet Explorer is a smoother ride. But Netscape's cross-platform focus is at the core of the company's approach to the Web, and that hasn't kept the company from producing a very usable and capable Windows browser, too.



In Internet Explorer, you can hide or expose the command buttons, URL location window, and Links display through drag-and-drop.



Netscape Navigator's classic interface has not changed much since early versions. Its bookmark feature is still the most flexible and easy to use.

Introducing.....

ProGen®

Polaris



PENTIUM® PRO
PROCESSOR

"12 years of experience",

in bringing new products to market will make a company define "state of the art". From multimedia to professional to workstation PCs, ProGen® systems offer the best value in the latest technologies. Expect equally solid service and support. The ProGen ProCare package features a 3-year limited warranty with 1-year on-site service*. Feature for feature, dollar for dollar, ProGen Systems offers the best value around. Speak to a ProGen consultant today and discover the difference & come and visit us at <http://www.progen.com> on the World Wide Web.

* On site service is based on the discretion of ProGen technical support. Leasing Rate will vary pending on State Legislation, and for business or corporate only. 30-day money-back Guarantee (shipping cost not included)

Polaris 180MHz

- Genuine Intel Performance/V5 Systemboard
- 256K Internal L2 Cache
- Faster PCI 2.1 compliant & EDO capable 82440FX PCIset
- **32 MB EDO RAM** (up to 128 MB)
- 1.6 GB Fast EIDE Hard Drive
- **ProGen GOLD 64V+ 2MB EDO (53 Trio 64V+), MPEG, Cinepak**
- 8X EIDE CD-ROM Drive
- 1.44 MB 3.5" Floppy Disk Drive
- 28.8kbps FAX/modem
- MS-Windows® NT Workstation v4.0
- 15" Digital PnP monitor
- Windows 95 Enhanced Keyboard
- Genuine Microsoft Mouse 2.0
- **ProGen ProCare Warranty** (3-yr + 1-yr on-site)

\$1999.00

200 MHz **\$2099**

We accept VISA, M/C, Discover, & American Express

1-800-848-1353

Customer Service: 1-800-848-8767

Technical Support: 1-888-777-5501

ProGen® Nova

- Genuine Intel Performance/V5 Systemboard
- 256K Internal L2 Cache
- Faster PCI 2.1 compliant & EDO capable 82440FX PCIset
- **32 MB EDO RAM** (up to 128 MB)
- Creative Labs SoundBlaster 32 PnP
- 1.44 MB 3.5" Floppy Disk Drive
- 33.6kbps FAX/modem
- 104-key Enhanced Keyboard for Win95
- Genuine Microsoft Mouse 2.0
- **New MS-Windows® NT Workstation v4.0**
- 80W PMPO Amplified Stereo Speakers
- **ProGen® ProCare Warranty** (3-yr + 1-yr on-site)

180 MHz EIDE **\$2569** 200 MHz SCSI **\$3949**

- **Panasonic 17" .27dp PnP Monitor**
- Large Capacity 2.5 GB Fast EIDE Hard Drive
- **Matrox Millennium 3D 1600x1200, 2MB VRAM**
- **Super 8X EIDE CD-ROM Dr.**
- **Panasonic 21" .25dp PnP Monitor**
- Large Capacity 2.1 GB Ultra SCSI Hard Drive
- Adaptec 2940 PCI Ultra SCSI Adapter
- **Matrox Millennium 3D 1600x1200, 4MB VRAM**
- **New 10X EIDE CD-ROM Dr.**

200 MHz SCSI w/ Panasonic 17"

\$3179

ProGen®

SYSTEMS

A Division of ProGen Technology Inc.



Sales Hours:
M-F, 6:30 A.M. - 7:00 P.M. PST,
Sat, 9:00 A.M. - 3:00 P.M. PST.
Tech Support/Customer Service:
M-F, 8:00 A.M. - 5:00 P.M. PST.

ProGen® Technology, Inc. 15501 Redhill Avenue, Tustin, CA 92780 Ph: 714/566-9200 Fax: 714/566-9267 BBS: 714/566-9255 E-Mail: progen@ix.netcom.com

©1996 ProGen® Technology, Inc. Intel Inside and Pentium Processor logo are registered trademarks and the Pentium Pro Processor logo is a trademark of Intel Corporation.

All other trademarks are the property of their respective owners. Prices are subject to change without notice

CIRCLE 264 ON READER SERVICE CARD

WEBMASTER FEATURES

Both browsers are fine for conventional sites. But new HTML style-sheet standards are changing the face of page design—and only Internet Explorer currently supports them.

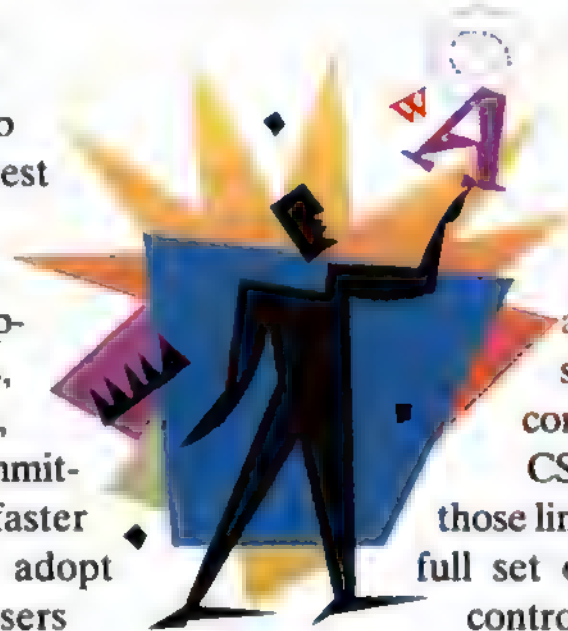
By John Clyman

A familiar advisory at many of the more inventive sites on the Web announces: "This site best viewed with Netscape Navigator." And with Netscape driving the development of HTML extensions, such as tables and frames, faster than the standards committees could keep up—and faster than competitors could adopt them—users of other browsers have been left wondering, "What am I missing out on?"

But the tide has turned. In most areas, Microsoft Internet Explorer 3.0, not Netscape Navigator 3.0, now leads in implementing the most interesting and significant HTML extensions, the capabilities Webmasters will use to build the next generation of cutting-edge sites. While both browsers can produce a respectable rendition of nearly any Web page, Internet Explorer provides superior support for tables, which allow organization of data into rows and columns, and frames, which permit pages to be split into multiple independent regions. More significantly, it supports Cascading Style Sheets (CSS) Level 1, a new HTML draft standard that gives Web designers unprecedented control over the typography and presentation of their pages.

SURF IN STYLE

HTML was created to define the structure of a document, not the details of its presentation. The page author could specify rough distinctions, such as "this is a headline" or "this is a hyperlink," but it was the Web browser that would decide how actually to render this information on a user's screen. Although HTML has



been extended with attributes that allow more control over the appearance of Web pages, even such simple concepts as indentation and line spacing have remained conspicuously absent.

CSS Level 1 addresses those limitations by providing a full set of basic typographical controls. Designers can specify paragraph margins (left, right, top, and bottom), indentation, fonts, line spacing, text highlighting, and more. And while it's possible to select type size in gross increments using plain-vanilla HTML, only CSS (and thus only Internet Explorer) currently allows specification of type size down to the point—or pixel, or pica, or any of a number of other measures. (Navigator 3.0 supports the FACE attribute for the FONT tag, a Microsoft HTML extension that allows control over the typeface that the browser uses.)

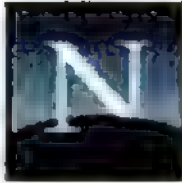
Beyond the advantage of greater control over presentation, CSS gives Web authors three important benefits:

- Stylesheets allow style information to be kept in a separate file from the HTML document, making sites far easier to maintain. Multiple pages or even an entire site can point to a single stylesheet, and changes to that one stylesheet will propagate across every page.
- You can apply stylesheets in a way that is generally transparent to noncompliant browsers; with care, there's no need to design completely separate pages.
- With stylesheets, you can use HTML to create display elements, such as headlines, that have traditionally required the use of bulky GIFs.

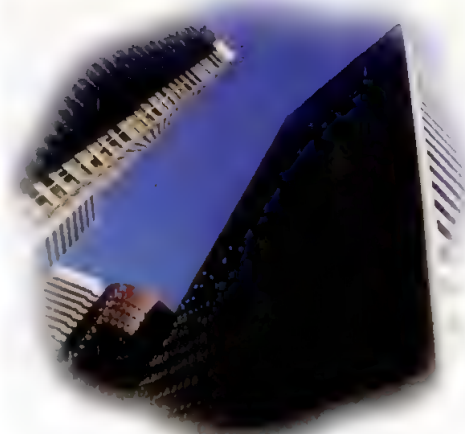
Netscape has pledged to support style-sheets in Navigator 4.0, scheduled for beta release this fall. What's unclear is whether Navigator will support the same CSS standard as Microsoft. In the meantime, Netscape has adopted several proprietary tags that permit some additional control over presentation. Netscape's MULTICOL tag flows text automatically into multiple columns, with adjustable column width and inter-column spacing. (Traditionally, HTML authors have simulated columns by using tables, an awkward solution.) Additionally, Netscape's SPACER tag permits the insertion of either horizontal or vertical white space of a specified number of pixels.

FRAMES AND TABLES

Frames, which let multiple panes of information occupy a single browser screen, have become a commonplace fixture on the Web. Both Navigator and Internet Explorer support basic and borderless frames, which have no visible divider between

WEBMASTER FEATURES		
		
Excellent	Basic HTML	Excellent
Fair	Typography	Excellent
Good	Graphics & multimedia	Excellent
Fair	Page layout	Excellent
Good	Frames support	Excellent
Fair	Tables support	Good
Excellent	Forms	Excellent

Basic HTML covers HTML 2.0 compliance plus some HTML 3.2 features, such as subscripts and superscripts. **Typography** covers the browsers' support for font specification, type size, line spacing, color, highlighting, and so on. **Graphics & multimedia** covers support for various image types, including background images, low-resolution image previews, transparent images, and animations. We also rate support for .AVI and MPEG video and for background sounds. **Page layout** covers formatting of text blocks with margins, indentation, columns, and the like. **Frames** covers support for standard, borderless, and floating frames, plus control over attributes such as border size and color. **Tables** covers the browsers' support for tables, table background colors and images, captions and borders, and row and column merging. **Forms** covers support for all HTML form elements.



your organization

Introducing Project Scheduler™ 7 for Windows 95 and NT.



STARTING TODAY, ONE
PROJECT MANAGEMENT PACKAGE
MEETS THE NEEDS OF BOTH.



your team



Your team needs a sophisticated, yet easy to learn project management tool. Your organization demands flexible and timely access to project data. Now there's a software package that meets the needs of both – Project Scheduler 7.

PS7's on-line guides, extensive Help menus and Wizard Technology ensure that you're off to a quick start. Customizable toolbars, menus and layouts provide uncluttered access to the features you use most. Power players will appreciate Project Scheduler's multi-project management, efficient resource leveling and custom formula support. Plus, our built-in Report Writer will make short work of all your reporting requirements.

Use Project Scheduler's advanced e-mail, OLE-2, SQL and ODBC to exchange data easily with your team. You can even post project status reports directly on your intranet using the HTML publishing feature.

With the time you save on routine tasks, you'll be able to uncover opportunities and implement strategies that put you and your entire organization ahead.



©1996 Scitor Corp. 333 Middlefield Road, Menlo Park, CA 94025 Tel: 415-462-4200 Fax 415-462-4301 Internet: sales@scitor.com
In Argentina: 541-322-0341 In Australia: (044) 417-287 In Brazil: 55-11 816-3439 In France: (1) 44 32 05 00
In Germany: (01 80) 535 6880 In Israel: (03) 642-6599 In Malaysia: 60 3 495-4048 In Singapore: 65-284-8528
In So. Africa: (011) 706 7015 In Sweden: 46 40 122774 In the UK: 1384 392121 Project Scheduler 7 is a registered trademark,
and the Scitor name is a trademark of Scitor Corporation. Windows is a trademark of Microsoft Corporation.

Call 1-800-533-9876

Visit our Web site at: www.scitor.com

Browsers at the Crossroads

panes and thus allow a more seamless presentation. Both browsers also support a variety of controls over frame attributes, such as whether a frame has scroll bars or is resizable. And both allow nested frames.

Despite this commonality, there are subtle differences. Navigator recognizes attributes that define a border's thickness and color. Microsoft supports the novel and far more sophisticated concept of floating frames, which differ from traditional frames in their ability to appear anywhere on a Web page. Floating frames are a powerful concept that we expect to see more.

Both Navigator and Internet Explorer support tables, and both support grouping of multiple rows and columns, table borders, nested tables, and cell background colors. Yet here, too, Microsoft has taken an incremental lead. Although the World Wide Web Consortium (W3C), which holds formal responsibility for HTML specifications, has not yet ratified a standard for tables, Internet Explorer is closer to supporting RFC (Request For Comments) 1942, the proposal likely to be adopted. Internet Explorer can place background images in table cells and draw different types of borders between cells. As this latter capability is improved, it will become particularly valuable for presentation of complex tabular data, such as balance sheets.

LIGHTS, SOUND, ACTION

In the areas of graphics and multimedia, Navigator and Internet Explorer support slightly divergent capabilities. Nei-

ther is markedly superior, but each has unique strengths and weaknesses. The browsers share the ability to handle basic graphics types, including JPEGs, GIFs, transparent GIFs, and GIF89a animations. Both can handle client-side image maps. Internet Explorer also supports .BMP files, a format seldom found on the Web.

The real differences between them are more esoteric. Navigator, for example, supports the LOWSRC attribute to the IMG tag, which lets designers specify a lower-resolution preview version of a graphic that loads before the full image. That can be particularly useful over slow connections. Internet Explorer, on the other hand, supports a simple DYN SRC attribute that provides nearly the opposite function: It loads an Audio-Video Interleaved (AVI) animation, rather than simply displaying a static graphic. Internet Explorer also provides native support for MPEG-1 video playback, while Navigator does not.

Both Navigator and Internet Explorer support background graphics, but only the latter supports watermarks, or non-scrolling backgrounds—a very minor plus. Both browsers support background sounds as well, each using its own syntax.

BASIC HTML AND FORMS

Both Navigator and Internet Explorer feature strong compliance with HTML 2.0 standards, and perhaps not surprisingly, each browser also supports a handful of minor proprietary extensions. Internet Ex-

plorer can produce horizontal rules in different colors. It also provides a built-in marquee control that can generate ticker tape-style scrolling text, as many Java applets do.

Netscape supports the BLINK tag, which simply causes text to flash—annoyingly, some feel—and the ALINK attribute to the BODY tag, which changes the color of links as they are clicked.

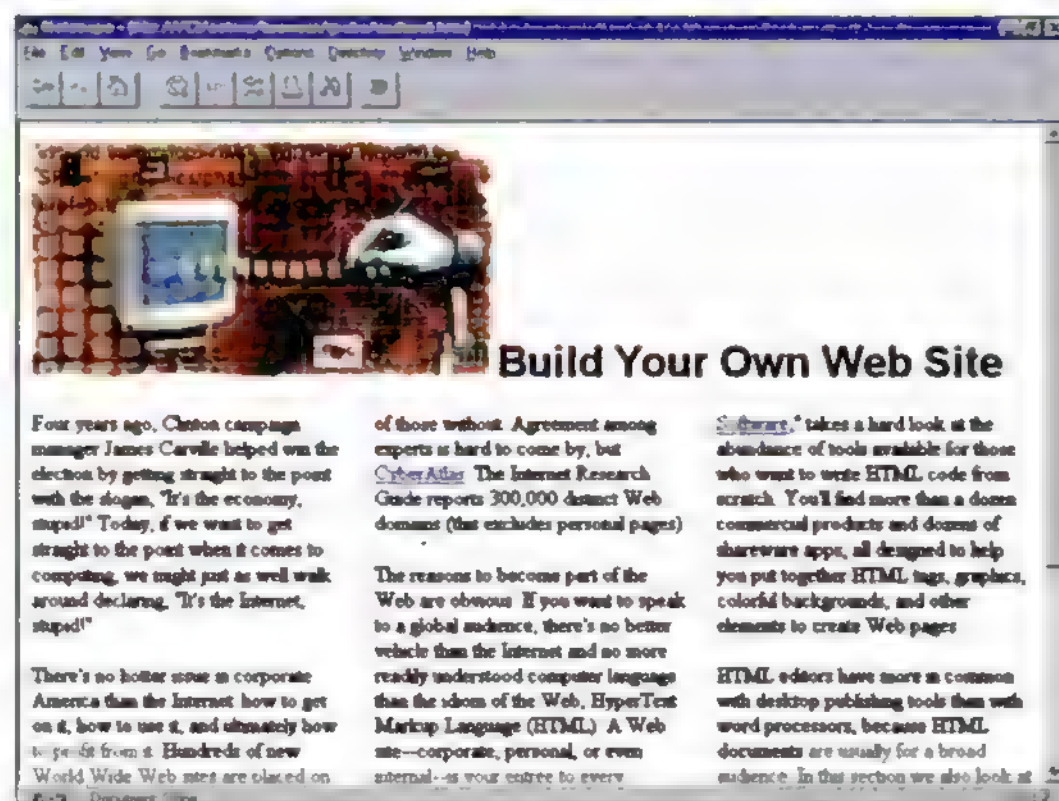
Navigator offers a few relatively insignificant options that Internet Explorer lacks for presenting lists: It permits specification of the type of bullets to be used in bulleted lists, for instance, and it supports a DL COMPACT tag that produces very compact directory listings.

Both browsers support META tags to enable capabilities such as client pull, which causes a page to refresh automatically after a given time has elapsed. Internet Explorer recognizes one key META tag that is currently ignored by Navigator: the tag that shows a Web page's rating from a PICS (Platform for Internet Content Specification) system such as RSACi, the Recreational Software Advisory Council's standard for rating violence, language, and sexual content.

Feature for feature, Internet Explorer 3.0 has managed to match or exceed Navigator's HTML support in almost every significant area. While Netscape promises support for key enhancements, such as stylesheets, in future releases, Microsoft has succeeded in producing a more capable product for use today.



Internet Explorer's support for cascading stylesheets gives Webmasters true typographic control for the first time.



Netscape Navigator supports tags that will automatically flow text into multiple columns.

A dimly lit room with a desk, a lamp, and a window. The scene is dark, with a warm, yellowish light coming from a window on the right. On the desk, there is a small, glowing red object, possibly a lamp or a small fire. The overall atmosphere is mysterious and somewhat eerie.

200MHz.

8X CD-ROM.

3.0GB.

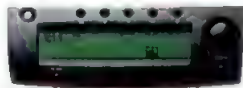


10:11 PM



Introducing the new Infinia with InTouch.

Tune in to Infinia™, the new high-performance home PC from Toshiba that lets you move from function to function with the touch



Jump from CD to TV to radio to answering machine, each with the touch of a button.

of a button. It's

designed to be right at home in your home—from its

while you listen to the radio.

Update your sales database

as you watch the big game

on TV, or talk to your dad in

another city on the speaker-

phone. In fact, Infinia offers so many advanced

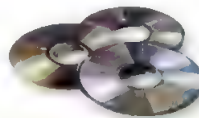
features, you won't believe your eyes. Simply turn

easy-to-use features to its sleek midnight-gray

design. Then, there's the InTouch™ Module. A

remarkable new device which makes computing

easier than ever before. With just a button, for



8X CD-ROM, 3D video and beautiful stereo sound enhance multimedia performance.

the page and

see for yourself.

Plus, it's from Toshiba, the number one name

in portable computers. To learn more about the



Infinia offers a fast 200MHz Pentium processor, and huge 3.0GB hard drive.

example, you can go from CD,

to TV, to radio, to telephone or

answering machine. It's that

simple. Trade stocks online

Infinia, visit the

Toshiba website at

<http://computers.toshiba.com> or simply call us

toll free anytime, any day at 1-800-457-7777.

Infinia is supported by Toshiba's InTouch Center every day, 24 hours-a-day.

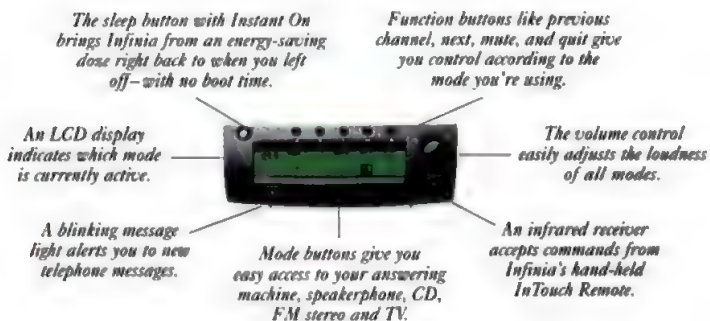


When you're ready for a different computer.

In Touch with Tomorrow
TOSHIBA



InTouch Module with LCD Display



Infinia 7200

- 200MHz Pentium® processor
- 32MB EDO DRAM, expandable to 128MB
- 3.1 billion byte (≈3.0GB) hard drive
- InTouch™ Module with LCD display and InTouch Remote
- Television tuner and FM radio card included
 - Full-motion live video capture and display
 - Cable TV reception in stereo
- Wave Table MIDI sound

Infinia 7160

- 166MHz Pentium® processor
- 16MB EDO DRAM, expandable to 128MB
- 2 billion byte (≈1.9GB) hard drive
- InTouch™ Module with LED display
- Television tuner and FM radio card optional

Infinia 7130

- 133MHz Pentium® processor
- 16MB EDO DRAM, expandable to 128MB
- 1.6 billion byte (≈1.5GB) hard drive
- InTouch™ Module with LED display
- Television tuner and FM radio card optional

All Models

Hardware

- 256KB pipeline burst SRAM level 2 cache
- 8X CD-ROM
 - 145ms average random seek
 - 1200KB/s transfer rate
 - Tray type load and eject
 - 128KB buffer
- DVD-ready*
- 28.8Kbps data/fax/voice modem, (software upgradeable to 33.6Kbps)
 - Full-duplex speakerphone
 - Digital answering machine
 - Internet-ready
- S3 ViRGE™ 3D graphics accelerator
 - 2MB 50ns EDO DRAM
- 16-bit SoundBlaster® Pro compatible audio system with SRS® 3D sound
- Full-length expansion slots
 - Three 32-bit PCI slots
 - Three 16-bit ISA slots
- Two 5.25" and one 3.5" available expansion bays
- Sleep button with Instant On
- Two Universal Serial Bus (USB) ports and one MIDI/joystick port
- Speaker-out and line-in jacks
- Keyboard and mouse

Software

- Windows® 95 with Microsoft® Plus!
- Microsoft® Works 4.0
- Microsoft® Encarta® 1996 Encyclopedia
- Microsoft® Money
- Dow Jones Personal Journal®
- Quicken® SE
- America Online®
- CompuServe®
- Netscape Navigator™ Personal Edition
- Prodigy®
- Plus many more educational and entertainment titles

Service/Support

- One year in-home warranty
- Supported by Toshiba's InTouch Center – 24 hours, 7 days a week

Optional Color Monitors

- 17" (16.23" viewable image)
- 15" (13.78" viewable image)
- .28mm dot pitch
- Built-in stereo speakers (includes sub-woofer on 17")
- One-touch tilt base for easy adjustment
- Integrated microphone
- Microphone and headset jacks

In Touch with Tomorrow
TOSHIBA



©1996 Toshiba America Information Systems, Inc. Infinia is a trademark of Toshiba America Information Systems, Inc. *When available, a DVD drive can be purchased and installed by an authorized Toshiba reseller. The model shown is the Infinia 7200 with an optional monitor. Some specifications vary by model. All specifications and availability are subject to change. All products indicated by trademark symbols are trademarked and/or registered by their respective companies. Intel Inside and Pentium Processor Logos are trademarks of Intel Corporation.

CIRCLE 379 ON READER SERVICE CARD

DEVELOPER PLATFORMS

Although Microsoft's and Netscape's solutions for developing Web-based applications have many features in common, the companies are moving in fundamentally different directions.

By Thomas Mace

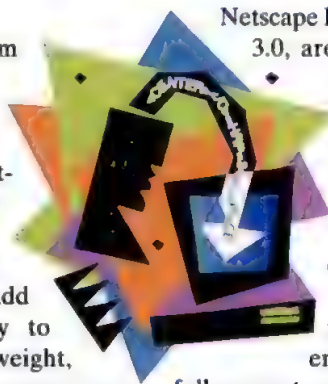
Web browsers have quickly evolved from simple HTML engines into full-fledged application platforms. The underpinnings of these platforms—browser extension APIs, scripting languages, browser objects, and Java—let developers add rich custom functionality to what are otherwise lightweight, generic environments. In every area, from Web-based multimedia to intranet client/server applications development, the effect of the browser platform has been profound.

More than any other vendor, Netscape has pioneered the concept of the browser as an application host. The Netscape Navigator 3.0 platform consists of five basic elements: Navigator plug-ins, Java, JavaScript, Navigator browser objects, and LiveConnect, a set of browser services that can tie the other elements together.

Given Netscape's overwhelming market dominance, Microsoft had little choice but to clone the Navigator platform. Microsoft Internet Explorer 3.0 does this with reasonable success and in some areas significantly improves on Netscape's implementation. Internet Explorer also introduces ActiveX, an important new standard based on Microsoft's Component Object Model (COM) that offers significant benefits to developers in 32-bit Windows environments.

PLUG-INS AND JAVA

The best-known Navigator extension standard is the Plug-in API, and some of the Web's most interesting rich-media types are delivered via plug-ins. The tools for building plug-ins, provided in the



Netscape LiveConnect/Plug-in SDK 3.0, are aimed at C developers and provide for relatively straightforward ports of existing code. Plug-ins are platform-specific; developers need to create separate versions for each operating environment they wish to support. They are also inherently insecure, as they have full access to system services, including memory and file I/O.

Internet Explorer 3.0 supports most major plug-ins, including such staples as Envoy, ichat, RealAudio, and Shockwave. Some less common plug-ins, however, do not work reliably. Microsoft blames its spotty support on Netscape's failure to publish a plug-in container specification (the Plug-In API itself is public).

While plug-ins have proved highly successful with developers, Netscape is moving toward Sun Microsystems' Java programming language as its core browser-enhancement technology. Navigator 2.0 was the first major commercial browser to provide a Java virtual machine (VM), and Navigator 3.0 introduces a powerful Java enhancement, a just-in-time (JIT) compiler that compiles Java programs into faster native machine code on the fly.

Unlike plug-ins, Java applets are platform-independent. Java also offers a tight "sandbox" security model, letting the browser trap and disallow all memory- and file-access calls. Java has enormous potential for corporate developers who must deploy applications across multiple hardware and operating-system platforms. Navigator 3.0, available for 32-bit and 16-bit Windows, Macintosh, and 11

Unix operating systems, is supremely well positioned as a cross-platform Java host.

Sadly, our tests of the Navigator Java VM (in the 32-bit Windows implementation) showed it to be buggy and on the slow side. In contrast, Internet Explorer's implementation of the Java VM and JIT is stable and fast. Interestingly, we found that neither browser is capable of supporting highly complex Java applications that employ with large data structures. (For a detailed look at all our Java test results, see "Java Speed Trials" in this issue.)

SCRIPTING AND BROWSER OBJECTS

Netscape Navigator 3.0 provides a simple programming language and runtime environment called JavaScript, which despite its name bears almost no resemblance to Java. JavaScript code is transmitted to the browser in text form as part of the HTML page. You can use it to generate new

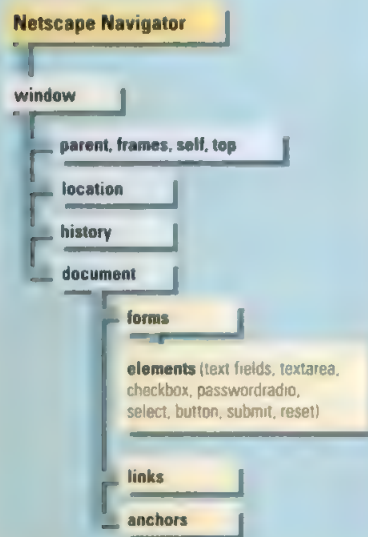
DEVELOPER PLATFORMS		
		
Excellent	Web applications	Excellent
Good	Intranet applications	Excellent
Excellent	Client-side scripting	Excellent
Good	Programmable objects	Excellent
Good	Browser extensibility	Excellent
Excellent	Plug-in support	Fair
Fair	Java support	Good
N/A	ActiveX support	Excellent
Excellent	Cross-platform support	Poor
Excellent	Security	Excellent

N/A—Not applicable. The product does not have this feature.

For Web applications, we rate each browser as a platform and as a delivery vehicle for publicly accessible sites. **Under intranet applications**, we provide a comparable rating for complex corporate applications. **Client-side scripting** covers the power and quality of the browser's scripting language(s). **Programmable objects** covers the richness of programmatically exposed browser functionality. **Browser extensibility** reflects each browser's overall extension architecture. **Plug-in support** reflects the browser's ability to host plug-ins. **Java support** describes each one as a Java runtime environment. **ActiveX support** describes the browser as an ActiveX container and server. **Cross-platform support** reflects the browser's availability on multiple hardware and OS platforms. **Security** describes the model for protection against malign browser extensions.

Netscape Navigator Browser Objects

The logical hierarchy of programmable browser objects exposed by Netscape Navigator 3.0



HTML page elements on the fly, respond to user actions such as button clicks and check-box selections, or perform simple client-side processing and data validation. JavaScript does not have file- or memory-access capabilities, so it is highly secure.

Internet Explorer provides two scripting languages. The first, JScript, is a very close clone of Netscape's JavaScript. The second, Visual Basic Scripting Edition (VBScript), is Internet Explorer's native scripting language. VBScript, derived from Basic, has a decidedly different flavor from JavaScript but offers comparable features, ease of use, and security.

One of the most powerful features of browser scripting languages is their use of *browser objects*, units of ready-made functionality that the browser exposes to the programmer. Navigator provides a comprehensive set of browser objects, many of which encapsulate the elements of HTML pages and forms. Text fields, buttons, radio buttons, and check boxes are among the most useful. Others, such as the history list, encapsulate elements of Navigator itself. With a few annoying exceptions, Internet Explorer implements the Navigator browser objects and methods, and you work with them using either JScript or VBScript.

Internet Explorer also exposes a different and very important set of objects

called ActiveX controls. These are a simplified superset of the familiar OLE controls used by Visual Basic and many third-party development tools. Although ActiveX is not a formal standard, both the control and container specifications are publicly available. Internet Explorer exposes the usual buttons and list boxes as well as image, hot-spot, marquee, multimedia, and other controls, which can be put on your HTML page and manipulated using JScript or VBScript. Internet Explorer itself is programmable through its ActiveX interfaces, so developers can build fully customized browser containers.

More importantly, the ActiveX environment lets you add third-party ActiveX controls to your pages. More than 1,000 controls are now on the market. You'll find everything from fully functional spreadsheets to 3-D world viewers, and these controls largely surpass anything currently available for Java. Generally, these controls are far easier to integrate into applications than plug-ins or Java applets. ActiveX controls not originally built for Web use may be quite large, however.

LIVECONNECT AND ACTIVE CONTENT

The biggest change that Navigator 3.0 brings to the Netscape browser platform is LiveConnect, a set of browser services for combining JavaScript, Java, plug-ins, and HTML objects into compound applications via a common object model, the Java Runtime Interface. LiveConnect programming is not trivial. Programmers must know the calling conventions of each object used, which probably means having access to the source code. But LiveConnect is significant in allowing integration of robust elements written in C with the Java/JavaScript environment.

Internet Explorer provides a comparable environment, based on ActiveX, that unifies ActiveX controls, Java, plug-ins, HTML objects, and the two scripting

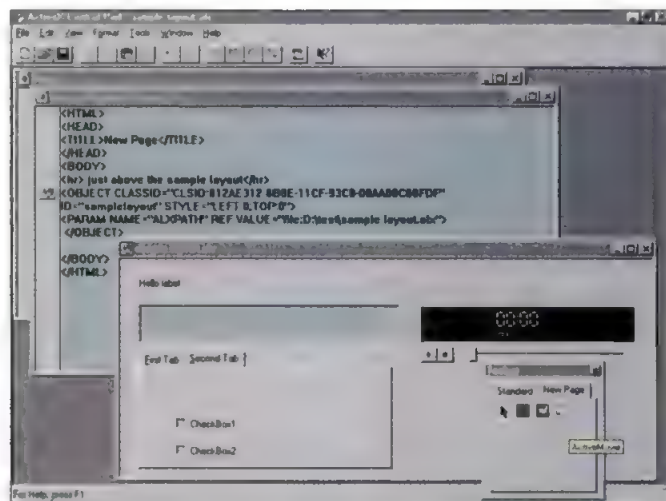
languages. Under Internet Explorer, all Java applets are automatically wrapped in an ActiveX automation interface, making them full members of the ActiveX environment. In many ways, Microsoft's solution is more tightly integrated and easier to work with than Netscape's. Its drawback is that, like all ActiveX technology, it is limited to 32-bit Windows.

INTERNETS AND INTRANETS

For developing public Web sites designed to reach the largest possible audience, your only real option today is the Netscape platform, with its plug-ins, Java, and JavaScript. Navigator's plug-in support is clearly more reliable than Internet Explorer's, while Internet Explorer offers a superior Java environment.

For corporate intranet applications, the choice is more complex. Neither browser has what it takes to support heavy-duty Java applications with large data structures. ActiveX and its related technologies are the most attractive option for 32-bit Windows shops, but companies with 16-bit Windows legacy systems, Unix desktops, and Macintoshes will have to look elsewhere for now.

The only remaining option is to use Navigator plug-ins, possibly with the addition of lightweight Java applets and script. This somewhat retro solution is platform-dependent and lacks a clear upgrade path to Java or ActiveX. Today your choice of platform will involve compromises. We hope to see the next browser generation expand the options further.



Powerful ActiveX controls and slick tools for working with them make Internet Explorer extremely attractive for developers.

LOOKING FOR THE BEST PCs ON THE MARKET?



MICRON[™]
ELECTRONICS, INC.

WHAT A COINCIDENCE, WE HAPPEN TO MAKE THEM.



pentium
PROCESSOR



NOW YOU GET TWICE THE MEMORY IN SELECTED
SYSTEMS! (SEE CONFIGURATIONS)

Micron Electronics brings super high-tech manufacturing to the PC factory floor. Recently we've invested millions of dollars to build the most advanced PC manufacturing facility possible.



Outstanding Performance—Don't Take Our Word for It.

Talk is cheap when you're speaking for yourself. But when it's from the mouth of an industry expert, it carries weight. Here are a few of many examples of what they're saying about our PCs:

- Home MPC "... the fastest we've ever tested ... as well as a marvelous family package ... it wins our Top Rated award. ..." —*Family PC*, May 1996
- Millennia "In short, Micron covers all the bases with this Best Buy." —*PC World*, March 1996
- PowerServer "This is definitely a best buy." —*Computer Shopper*, January 1996
- Millennia TransPort "... nearly a dead ringer for IBM's ThinkPad ... but performs better and saves you about \$2,500." —*PC Magazine*, April 1996

The Right System for You

Micron Electronics makes a suite of outstanding solutions designed for the way you work or play. From home systems to servers, desktop PCs to portable multimedia solutions, Micron Electronics always comes through with a system built to satisfy. For details and prices, turn the page.

Micron Power **Warranty & Support**

- 3-year limited warranty on all processors and main memory
- 3-year limited platform system warranty
- 2- to 5-year platform service agreement for Micron desktop systems
- 90-day Micron software support and software support for Micron desktop systems
- 24-hour technical support

©1996 Micron Electronics, Inc. All rights reserved. Micron Electronics, Inc. is a registered trademark of Micron Electronics, Inc. All other trademarks are the property of their respective owners. Micron Electronics, Inc. is not responsible for the content of this advertisement. Micron Electronics, Inc. is not responsible for the content of this advertisement.



MICRONTM
ELECTRONICS, INC.

800-707-2329

<http://www.mei.micron.com>

With our legacy of memory and manufacturing expertise, Micron Electronics has just doubled memory in several systems (see configurations). We've added other powerful enhancements to give you a vast increase in system capacity.

MILLENNIA™ P166

- Intel 166MHz Pentium® processor
- 512KB pipeline burst cache, flash BIOS
- BX EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- 5-year/3-year Micron Power™ warranty

- 16MB EDO RAM • 12GB EIDE hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Works 95 CD

\$1,999 Business lease \$48/month

- 32MB EDO RAM • 2GB EIDE hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Office Pro 95 & Bookshelf® 95 CDs

\$2,399 Business lease \$82/month

- 64MB EDO RAM • 3.1GB EIDE hard drive
- 17" Micron 17FGx, 26dp (15.8" display)
- Microsoft Office Pro 95 & Bookshelf 95 CDs

\$3,149 Business lease \$107/month

- With 133MHz Pentium processor.....subtract \$200
- With 200MHz Pentium processor.....add \$100

MILLENNIA™ P200 PLUS

- Intel 200MHz Pentium processor
- 512KB pipeline burst cache, flash BIOS
- PCI 32-bit Ultra SCSI Fast-20 controller
- BX SCSI CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 & MS Plus! CD
- 5-year/3-year Micron Power warranty

- 16MB EDO RAM • 2GB Fast SCSI-2 hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Works 95 CD

\$2,899 Business lease \$99/month

- 32MB EDO RAM • 2GB Fast SCSI-2 hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Office Pro 95 & Bookshelf 95 CDs

\$3,199 Business lease \$109/month

- 64MB EDO RAM • 4GB Fast SCSI-2 hard drive
- 17" Micron 17FGx, 26dp (15.8" display)
- Microsoft Office Pro 95 & Bookshelf 95 CDs

\$4,249 Business lease \$145/month

- With 166MHz Pentium processor.....subtract \$100

HOME MPC™ P133

- Intel 133MHz Pentium® processor
- 256KB pipeline burst cache, flash BIOS
- 16MB EDO RAM • 1.2GB EIDE hard drive
- BX EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- 28.8 fax/modem, speakerphone, voice mail
- Microsoft® Phone telephony software
- Internet ready: Internet in a Box from CompuServe®/Spry Microsoft Internet Explorer
- Prodigy®, America Online® & CompuServe trial memberships
- PCI 64-bit 3D video, MPEG, 2MB EDO
- 15" Micron 15FGx, 28dp (13.7" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- Quicken® Financial Pak includes: Quicken Deluxe 5.0; Quicken Financial Planner™; Quicken Parents' Guide to Money™; Quicken Family Lawyer™
- Family Pak includes: ABC by Dr. Seuss; Thinkin' Things™ Collection 1; Earthworm Jim™; and Mechwarrior™ 2
- Microsoft Home Pak includes: Works 4.0 for Windows 95; Publisher Deluxe for Windows 95; Encarta® 96; Encarta 96 World Atlas; Music Central® 96; Wine Guide; Arcade 1.0; Scenes—Sports Extremes Collection; Cinemania™ 96; Julia Child Home Cooking; Best of Windows Entertainment Pack; CD Sampler (including Fury® game demo)
- 5-year/3-year Micron Power™ warranty

\$1,999

- With 166MHz Pentium processor.....add \$200

HOME MPC™ P200

- Intel 200MHz Pentium processor
- 256KB pipeline burst cache, flash BIOS
- 32MB EDO RAM • 2.1GB EIDE hard drive
- BX EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit 3D Waveable stereo sound card
- Advent AV270 2x25 watt stereo speakers
- 28.8 fax/modem, speakerphone, voice mail
- Microsoft® Phone telephony software
- Internet ready: Internet in a Box from CompuServe®/Spry Microsoft Internet Explorer
- Prodigy, America Online & CompuServe trial memberships
- PCI 64-bit 3D video, MPEG, 2MB EDO
- 15" Micron 15FGx, 28dp (13.7" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 & MS Plus! CD
- Microsoft Office Pro 95 & Bookshelf® 95 CDs
- Quicken Financial Pak includes: Quicken Deluxe 5.0; Quicken Financial Planner; Quicken Parents' Guide to Money; Quicken Family Lawyer
- Family Pak includes: ABC by Dr. Seuss; Thinkin' Things™ Collection 1; Earthworm Jim™; and Mechwarrior™ 2
- Microsoft Home Pak includes: Works 4.0 for Windows 95; Publisher Deluxe for Windows 95; Encarta 96; Encarta 96 World Atlas; Music Central 96; Wine Guide; Arcade 1.0; Scenes—Sports Extremes Collection; Cinemania 96; Julia Child Home Cooking; Best of Windows Entertainment Pack; CD Sampler (including Fury game demo)
- 5-year/3-year Micron Power warranty

\$2,899

- With 166MHz Pentium processor.....subtract \$100
- With 17" Micron 17FGx, 26dp (15.8" display).....add \$250

NEW



January 9, 1996
Millennia Line



January 30, 1996
Millennia P166



January 30, 1996
Millennia P200



August 1996
Millennia TransPort



August 1996
Millennia P133



August 1996
Millennia P200



May 30, 1995
Millennia P120



May 16, 1995
Home MPC P90



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995



1994 and 1995

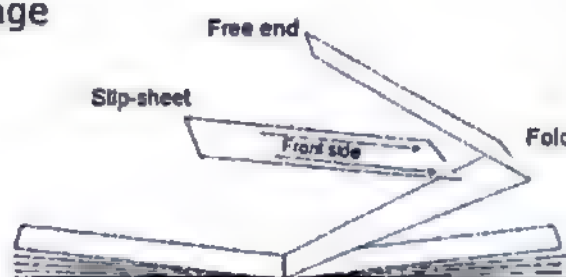


1994 and 1995

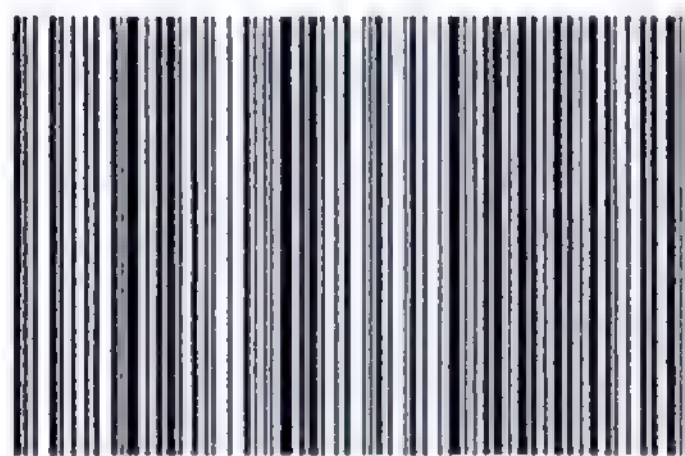


1994 and 1995

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



GbsSlipSheet-001

Inverted Foldout slip-sheet

Folded edge of the page

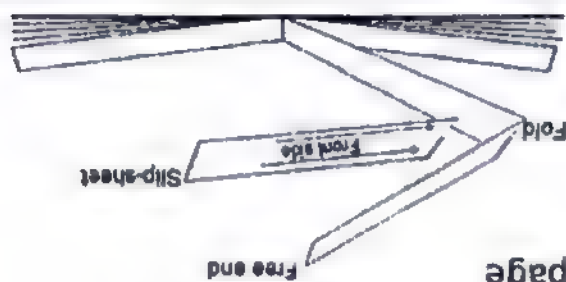
1. Open the foldout page
2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

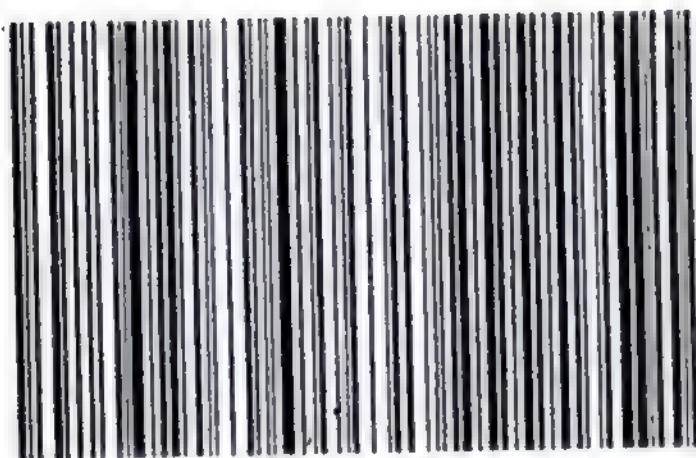
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



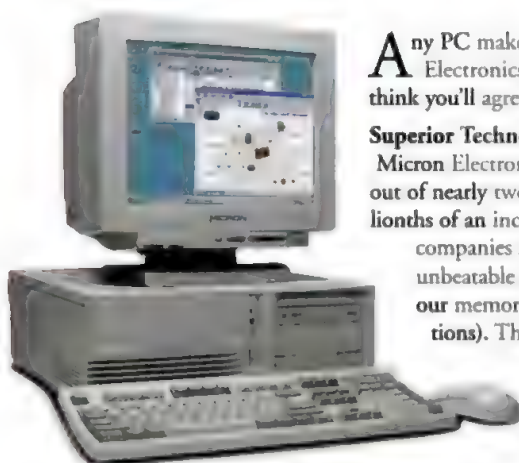
GbsSlipBack-001B

Back

1. Follow instructions on the other side



SUPERIOR SOLUTIONS BY DESIGN



Any PC maker can claim to offer a solution that covers your needs. But at Micron Electronics, we prefer to let our history and our products speak for themselves. We think you'll agree it's an impressive story.

Superior Technology—A Micron Tradition

Micron Electronics builds PCs with a legacy of excellence. Our manufacturing processes grew out of nearly two decades in the semiconductor business, where precision is measured in millionths of an inch, and quality in parts per million. We've built strategic relationships with companies like Intel, Microsoft and Novell. From this solid background, we're forging unbeatable systems you can count on today and tomorrow. Best of all, we just doubled our memory and added powerful enhancements to several of our systems (see configurations). This industry-leading approach gives you a vast increase in system capacity.

Award-Winning Products

In the past two years, leading industry publications have applauded Micron Electronics PCs with more than 140 awards for product performance, customer service and support. This includes *PC Magazine* Best

Buy awards and you've got an impressive technology hall of fame. In fact, just this summer, we have won three *PC Magazine* Editors' Choice® Awards for Millennia™ desktop and Millennia TransPort™ notebook computers—an unprecedented achievement for Micron Electronics.

Recognized Service and Reliability

After your purchase, the story continues. Just ask *PC Magazine* readers. They bestowed on us the coveted Readers' Choice for Customer Service and Reliability in 1994 and 1995. And *PC World* recently awarded us first-tier status along with the likes of Apple, Compaq, Digital and HP. Pretty good company, wouldn't you say?

Micron Power™ Warranty—An Industry First

We support our reliability promise with the industry-leading Micron Power warranty. It backs the microprocessor and main memory for five years, an industry first. Add a three-year, parts-only system warranty and a 30-day money-back guarantee, and you can rest assured that you're in good hands.

RELIABILITY RANKING

1ST TIER

APPLE COMPAQ **MICRON** DIGITAL PERKINS PACKARD

2ND TIER

AST D A NEC

3RD TIER

ACER

Source: *PC World Reliability & Service Monitor*, May 20 - November 20, 1995

MILLENNIA TRANSPORT™

- Intel 430MX PCI chipset
- 256KB L2 pipeline burst cache
- 16MB EDO memory (48MB max.)
- 8X modular CD-ROM drive
- PCI graphics accelerator, 1MB EDO memory
- Pick-a-Point™ dual pointing devices integrate both pointing stick and touchpad
- Removable EIDE hard drive
- 3.5" modular floppy drive
- Intelligent modular lithium-ion battery
- 16-bit stereo sound
- Built-in stereo speakers and microphone
- 2 Type II or one Type III PCMCIA slots
- S-video and NTSC-video outputs
- Headphone, microphone and line-in jacks
- 2 infrared ports, one front, one back
- Parallel, serial, VGA and 2 PS/2 ports
- Dimensions: 11.7" x 9.4" x 2.0", Weight: 6.9 lbs.†
- Nylon carrying case
- Microsoft® Windows® 95 and MS® Plus! CD
- Microsoft Office Pro 95 and Bookshelf® 95 CDs
- Kensington™ security lock ready††
- 5-year/3-year Micron Power™ limited warranty

† 6.9 lbs. includes 3.5" floppy and one battery
†† Lock secures both Millennium Transport and MicronDock



- 133MHz Mobile Pentium processor
- 16MB EDO memory (48MB max.)
- 12.1" active matrix display, 800 x 600
- 1.2GB removable hard drive

\$4,399 Business lease \$150/month

- 133MHz Mobile Pentium processor
- 32MB EDO memory (48MB max.)
- 12.1" active matrix color display, 800 x 600
- 1.2GB removable hard drive
- Motorola® Montana 28.8 fax/modem
- 2nd lithium-ion battery

\$5,199 Business lease \$163/month

- 150MHz Mobile Pentium processor
- 32MB EDO memory (48MB max.)
- 12.1" active matrix color display, 800 x 600
- 2.1GB removable hard drive
- Motorola® Montana 28.8 fax/modem
- 2nd lithium-ion battery
- Samsonite® leather carrying case

\$5,550 Business lease \$174/month

OPTIONS

- With 150MHz Pentium processor.....add \$200
- With 2nd modular lithium-ion battery.....add \$199
- With 2nd 1.2GB hard drive.....add \$599
- With 2nd 2.1GB hard drive.....add \$699
- With 16MB DIMM module upgrade.....add \$349
- With 32MB DIMM module upgrade.....add \$749

POWERSERVER SMP-N P133

- Intel 133MHz Pentium® processor
- Dual Pentium SMP ZIF sockets
- 512KB write-back cache, flash BIOS
- Slots: 5 EISA, 2 PCI, 1 EISA/PCI
- Adaptec PCI 32-bit Ultra SCSI Fast-20 controller
- 8X SCSI-2 CD-ROM drive
- 3.5" floppy drive
- 64-bit 1MB ISA video
- 3Com® 3C595 PCI 10/100 Ethernet NIC
- Full-size tower with 10 drive bays
- Microsoft® Mouse, 104-key keyboard
- Novell® NetWare® 4.1 (5 user license)
- NOS support (3 free resolutions)
- 5-year/3-year Micron Power™ warranty

- 16MB RAM • 1GB SCSI-2 hard drive
- 15" Micron 15FGx, .28dp (13.7" display)

\$3,599 Business lease \$122/month

- 32MB RAM • 2GB Ultra SCSI hard drive
- 15" Micron 15FGx, .28dp (13.7" display)

\$3,799 Business lease \$129/month

Now shipping with Netware 4.0!

POWERSERVER SMP-N P266

- Dual Intel 133MHz Pentium processors
- 512KB write-back cache, flash BIOS
- Slots: 5 EISA, 2 PCI, 1 EISA/PCI
- Adaptec PCI 32-bit Ultra SCSI Fast-20 controller
- 8X SCSI-2 CD-ROM drive
- 3.5" floppy drive
- 64-bit 1MB ISA video
- 3Com 3C595 PCI 10/100 Ethernet NIC
- Full-size tower with 10 drive bays
- Microsoft Mouse, 104-key keyboard
- Novell NetWare 4.1 (5 user license)
- NOS support (3 free resolutions)
- 5-year/3-year Micron Power warranty

- 32MB RAM • 2GB Ultra SCSI hard drive
- 15" Micron 15FGx, .28dp (13.7" display)

\$4,799 Business lease \$163/month

- 64MB RAM • 4GB Ultra SCSI hard drive
- 15" Micron 15FGx, .28dp (13.7" display)

\$4,999 Business lease \$170/month



MILLENNIA™ PRO200

- Intel 200MHz Pentium® Pro processor
- 256KB internal cache, flash BIOS
- 8X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows NT® Workstation CD
- 5-year/3-year Micron Power™ warranty

- 16MB EDO RAM • 1.2GB EIDE hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Works 95 CD

\$2,249 Business lease \$77/month

- 32MB EDO RAM • 2.1GB EIDE hard drive
- 17" Micron 17FGx, .26dp (15.8" display)
- Microsoft Office Pro 95 & Bookshelf® 95 CDs

\$2,899 Business lease \$99/month

MILLENNIA™ PRO200 PLUS

- Intel 200MHz Pentium Pro processor
- 256KB internal cache, flash BIOS
- PCI 32-bit Ultra SCSI Fast-20 controller
- 8X SCSI CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO
- Tool-free mini-tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT Workstation CD
- Microsoft Office Pro 95 & Bookshelf 95 CDs
- 5-year/3-year Micron Power warranty

- 32MB EDO RAM • 2GB Fast SCSI-2 hard drive
- 15" Micron 15FGx, .28dp (13.7" display)

\$3,349 Business lease \$114/month

- 64MB EDO RAM • 4GB Fast SCSI-2 hard drive
- 17" Micron 17FGx, .26dp (15.8" display)

\$4,399 Business lease \$150/month

- 128MB EDO RAM • 9GB Fast SCSI-2 hard drive
- 21" Micron 21FGx, .26dp (20.0" display)

\$7,499 Business lease \$236/month

CLIENTPRO™ P120

- Intel 120MHz Pentium® processor
- 256KB pipeline burst cache, flash BIOS
- 3Com® 3C509 Combo network adapter
- 3.5" floppy drive
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- MS-DOS® 6.22/Windows® for Workgroups 3.11
- 5-year/3-year Micron Power™ warranty

- PCI 64-bit graphics accelerator (2MB EDO)
- 8MB EDO RAM • 1.2GB EIDE hard drive
- 14" Micron 14FGx, .28dp (12.9" display)
- Microsoft Works preinstalled

\$1,499 Business lease \$51/month

- PCI 64-bit graphics accelerator (2MB EDO)
- 16MB EDO RAM • 2.1GB EIDE hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Works preinstalled

\$1,819 Business lease \$62/month

- With 133MHz Pentium processor.....add \$50

CLIENTPRO™ P200

- Intel 200MHz Pentium processor
- 256KB pipeline burst cache, flash BIOS
- 3Com 3C509 Combo network adapter
- 32MB EDO RAM • 3.1GB EIDE hard drive
- 3.5" floppy drive
- 8X EIDE CD-ROM drive
- PCI 64-bit graphics accelerator (2MB EDO)
- 17" Micron 17FGx, .26dp (15.8" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT® Workstation
- Microsoft Office Pro 95 & Bookshelf® 95 CDs
- 5-year/3-year Micron Power warranty

\$3,207 Business lease \$106/month

- With 166MHz Pentium processor.....subtract \$100

Microsoft Windows NT Workstation 3.51 or 4.0
available on selected configurations.

International Sales
208-893-8970



International Fax
208-893-7393



Tollfree from Puerto Rico
800-708-1756



Tollfree from Canada
800-708-1758



Tollfree from Mexico
95-800-708-1755

• Technical Support Available 24 Hours A Day-7 Days A Week
• Technical Support E-mail: techsupport.micron.com

• 900 E. Karcher Road, Nampa, ID 83687
• Mon-Fri 6am-10pm Sat 7am-5pm (MT)
• International Sales Hours: Mon-Fri 6am-7pm (MT)
• 208-893-3434 • Fax 208-893-3424
• Purchase Order Fax 208-893-8992
• GSA Contract #G335F4317D

MICRON™
ELECTRONICS, INC.

800-707-2329

<http://www.mei.micron.com>

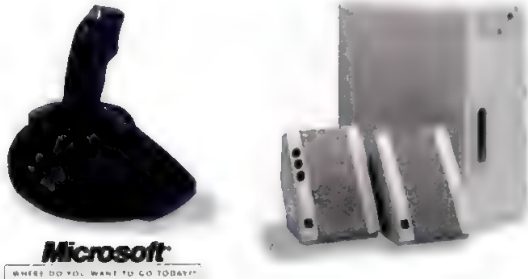
©1996 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice. Prices do not include shipping and handling. 30 day money-back policy does not include return freight and original shipping/handling charges. Applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Lease prices based on 36-month lease. Intel, Intel Inside and Pentium are registered trademarks of the Intel Corporation. Microsoft, Windows and the Windows logo are registered trademarks and Windows NT is a trademark of Microsoft Corporation. All other service marks, trademarks and registered trademarks are the property of their respective companies. FAM-PCMG-96108

Make a Great PC Even Better!

Custom configure your new Micron system with these popular options.

MULTIMEDIA OPTIONS

- 16-bit 3D WaveTable stereo sound\$59*
- 16-bit 3D WaveTable stereo soundcard w/2MB RAM\$99*
- Advent AV270 Powered Partners stereo speakers\$99
- Advent AV370 Powered Partners stereo speakers w/subwoofer\$199
- Microsoft® SideWinder™ 3D Pro joystick\$59



STORAGE/MEDIA OPTIONS

- Adaptec 2940U Ultra SCSI Fast-20 controller\$100
(upgrade from system with standard Ultra SCSI Fast-20 controller)
- Plextor 0Plex 8X 1.2MB/S SCSI internal CD-ROM drive\$200**
(upgrade from systems with standard 8X EIDE CD-ROM drive)
- Iomega Jaz SCSI drive with 1.0GB removable cartridge\$399**
- Iomega Zip IDE drive with 100MB removable cartridge\$99
- Iomega Ditto 800 (400/800MB) Travan Tape back up w/tape\$149
- Iomega Ditto 3200 (1.4/3.2GB) Travan Tape back up w/tape\$199
- Sony 4/8GB DDS-2 DAT SCSI Tape back up w/tape\$999**



COMMUNICATION OPTIONS

- 28.8kb V.34 internal data/fax modem\$139***
- 28.8kb V.34 internal telephony data/fax modem\$159****
w/full duplex speakerphone and voice mail



NETWORKING OPTIONS

- 3Com® 3C509 Ethernet ISA NIC (BNC, AUI & RJ-45)\$99
- 3Com 3C595 Fast Ethernet PCI 10/100 NIC (RJ-45 only)\$159
- SMC ISA TokenCard network card\$199

* Upgrade from systems with standard 16-bit stereo sound card
 ** Requires SCSI Host Adapter
 *** V.34 modem includes trial memberships to CompuServe®, Prodigy® and America Online®
 † Requires sound card
 †† Upgrade from systems with standard Micron 17" 17FGx color monitor
 ††† Upgrade from systems with standard 64-bit 2MB video card

Options and accessories available with systems purchase only.

QUICKEN® FINANCIAL PAK

- Quicken Financial Pak, including: Quicken Deluxe 5.0; Quicken Financial Planner™; Quicken Parents' Guide to Money™; Quicken Family Lawyer™\$69



DISPLAY/VIDEO OPTIONS

- 17" Hitachi SuperScan 1711 (15.9" display) 26dp color monitor\$150 ††
- 21" Hitachi SuperScan 2111 (20" display) 26dp color monitor\$1,050 ††
- Diamond Stealth64 video card w/2MB VRAM\$150 †††
- Diamond Stealth64 video card w/4MB VRAM\$300 †††
- #9 Imagine 128 series II video card w/4MB VRAM\$500 †††
- #9 Imagine 128 series I video card w/8MB VRAM\$750 †††

MILLENNIA TRANSPORT™ OPTIONS

- MicronDock™ multimedia port replicator: Ethernet LAN adapter, SCSI-2port, S-Video and NTSC video output, built-in stereo speakers, infrared port, headphone, microphone, line-in jacks, parallel, serial, VGA and 2 PS/2 ports\$299
- MicronExec™ desktop package: Matching black 17" monitor (15.8" display) with matching black mouse, mousepad and keyboard (can be used with or without MicronDock)\$799
- Motorola Montana 28.8 fax/modem supports regular telephone connections, cellular phones and two-way paging devices\$299



SERVICE OPTIONS

- Extended 2-year on-site service coverage for desktop systems\$99
(upgrade from optional 1-year on-site service coverage)
- Extended 3-year on-site service coverage for desktop systems\$139
(upgrade from optional 1-year on-site service coverage)
- Complete on-site PC installation (call Micron for details)\$159

OTHER OPTIONS

- APC Per7T surge suppressor\$39
- APC Pro7T surge suppressor\$59
- Microsoft Natural Keyboard®\$49
(upgrade from standard keyboard)

MICRON™
ELECTRONICS, INC.

800-707-2329

<http://www.mei.micron.com>

• 900 E. Ketcher Road, Nampa, ID 83687
 • Mon-Fri 9am-10pm Sat 7am-5pm (MT)
 • International Sales Hours: Mon-Fri 9am-7pm (MT)
 • 208-893-3434 • Fax 208-893-3434
 • Purchase Order Fax 208-893-8992
 • GSA Contract #6535H43170

• Technical Support Available 24 Hours A Day-7 Days A Week
 • Technical Support E-mail: techsupport@mei.micron.com

CIRCLE 370 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

Our Cross-Platform Solution Has Proprietary E-Mail Licked.



Industrial-strength e-mail plus Internet access in one affordable package.

 NetManage Z-Mail™ is a complete solution based on open Internet standards. Send mail—including files—to all users in your enterprise and over the Internet. You can even send attached image, sound, video, database and spreadsheet files. And there are extensive off-line features for remote and mobile users.

Z-Mail brings powerful standards-based messaging to the broadest set of platforms.

Administration is simple. Scripting lets you integrate Z-Mail with existing applications and create custom mail filters and rules. It eliminates expensive mail gateways.

So your cost of ownership is exceptionally low.

Z-Mail is part of the NetManage IntraNet Family—a full suite of products designed to help you build a powerful corporate IntraNet. Call now and GO! IntraNet today.



- Completely standards-based for the highest degree of present and future connectivity.
- Z-Mail Servers for Windows 95, NT and UNIX.
- Z-Mail Clients for Windows 3.1, 95 and NT, UNIX and Macintosh.
- Simple to install, setup and administer.
- Comprehensive solution for an exceptionally low price.

5 FREE Z-MAIL CLIENTS!
with every server purchased
before 11/30/96.

Download 30-day trial
software from our website.

1-408-342-7535

 **NETMANAGE®**
WE KNOW THE NET. INSIDE AND OUT.



sales.pci@netmanage.com
www.netmanage.com

PERFORMANCE TESTS

Netscape Navigator renders most HTML pages faster than Internet Explorer over both LAN and modem connections.

On some real-world pages, you'll notice the difference.

By Larry Seltzer

It's no shutout, but overall, Netscape Navigator 3.0 is faster at rendering HTML pages than Microsoft's Internet Explorer 3.0. Navigator's lead is most noticeable in LAN-based testing: In no case did Internet Explorer load a complete page as quickly as Navigator. As a rule, Navigator was also much faster at reloading pages from its cache. Over a modem connection, each browser led in some tests, but usually by an insignificant margin.



These differences will be even less noticeable with real Web pages than our tests might indicate, especially at modem speeds. But in some cases, they will make themselves felt.

TESTING BROWSERS

We tested both browsers on a private IP network using a standard Web server. We connected to the server both directly over a 16-Mbps Token-Ring network and over a 28.8-Kbps modem through a Windows NT

PPP RAS server, also on the network.

Instead of simply measuring the time for the page to load, we captured three results: the time needed to display the first usable element, the time needed to load the complete page, and the time needed to reload the page from the browser's cache. We cleared the cache and restarted the browser between each test.

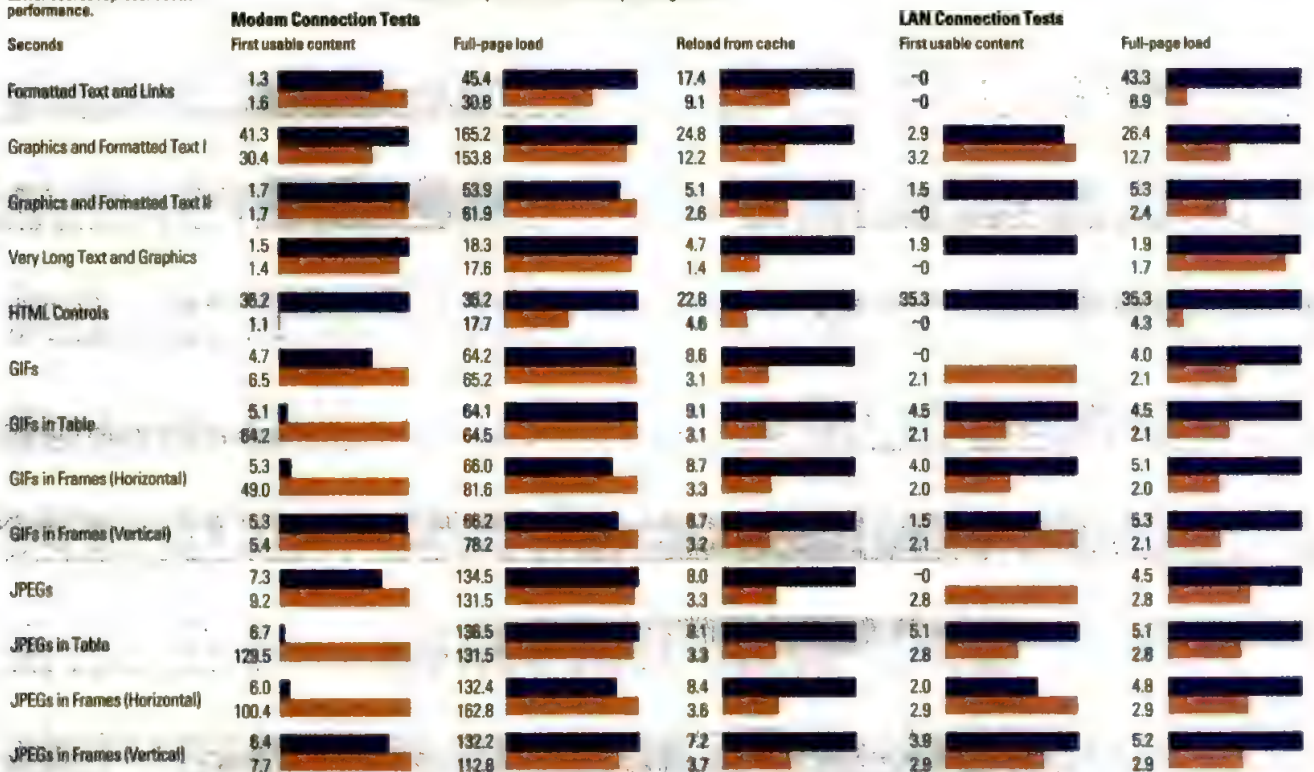
Instead of testing with real-world Web pages (which, at network speeds, loaded almost instantaneously in both browsers), we created a series of 13 highly stressful synthetic pages.

The Formatted Text and Links page is a 570K HTML file containing text and a large number of hyperlinks. Internet Explorer took consistently longer than Navigator to load the complete page.

The Graphics and Formatted Text I test document contains 480K of .GIF images and 37K of HTML. Again, Internet Explorer was slower. Over a modem, Internet Explorer also had more trouble than expected loading the first element quickly (the first element in the page is a large graphic that extends below the bottom of the first screen). The Graphics and Formatted Text II test document is small-

Lower scores represent better performance.

■ Internet Explorer 3.0 ■ Netscape Navigator 3.0



-0 represents a timing too short to be measured accurately.

er and contains both .GIFs and HTML. The Very Long Text and Graphics test page is more text-heavy and contains fewer graphics than the previous two tests. Navigator was generally faster in both.

Our HTML Controls page is extremely stressful: It contains 100 buttons, 100 radio buttons, 100 check boxes, 100 password-entry fields, and 100 list boxes, each populated with 100 elements. This test proved disastrous for Internet Explorer, which took more than twice as long as Netscape Navigator to load the full page. Surprisingly, Internet Explorer was unable to display a first element until it had loaded the entire page; Navigator was able to display the first element in just over 1 second.

Once Internet Explorer had loaded the HTML Controls page, we noticed that free Windows 95 user resources had dropped to 34 percent (Navigator left us with 55 percent free, a significant difference). Internet Explorer's difficulties in loading large numbers of controls are severe enough to affect its performance with real-world pages.

GRAPHICS TESTS

Our remaining eight tests concentrated on graphics. All are based on the same series of 51 images, formatted as both .GIFs and JPEGs. The basic .GIF and JPEG test pages load the images in 17 rows of three images each. In the two table tests, they are loaded as elements in a table with 17 rows and three columns. In the four horizontal and vertical frame tests, they are loaded in three frames containing 17 images each.

Over a modem, differences between the browsers in full-page loads were minimal, although Internet Explorer was consistently faster at rendering the first usable graphic. When the graphics were in a table or in horizontal frames, Navigator was unable to display any graphic until it had loaded almost the entire page.

Over a network, Navigator proved consistently faster than Internet Explorer at loading full pages. Navigator was not able to display initial elements, however, before rendering the entire page. In the simple .GIF and JPEG tests, Internet Explorer was able to display a usable graphic very quickly. But on some frame and table tests, Navigator was able to render an entire page before Internet Explorer rendered the first usable element.

WHY WE DON'T TEST ON THE INTERNET

We considered and rejected the possibility of testing across a live Internet connection. As attractive as this approach seems, results from such tests are meaningless. Conditions on the Internet are inherently unreproducible. It is next to impossible to know the conditions of the test, and those conditions are in constant flux.

For example, the first time you load a page from a remote server, the file may be read from the server's disk into a page cache. The page may also be routed through a proxy server, which will cache

the contents. Either way, a second page request will be serviced much more quickly than the first. It is also possible that a cache could be flushed between accesses. An even bigger problem is the fact that IP routing on the Internet can vary enormously, not only among longer or shorter routes with larger or smaller numbers of lines, but among faster or slower lines. Two requests for the same page will often travel different routes. Only by testing on a closed IP network are we able to deliver meaningful and repeatable results.

COLLABORATION TOOLS

Internet collaboration is a standard feature of both browsers. But application sharing and a state-of-the-art Internet telephone give Internet Explorer the edge.

By Jan Ozer

Internet collaboration gets a big boost from its inclusion in both Microsoft Internet Explorer and Netscape Navigator as a standard browser feature. On the surface, Internet Explorer's NetMeeting and Navigator's CoolTalk look quite similar. Both offer point-to-point Internet telephone and a variety of collaboration modules. But scratch a bit deeper and you'll find considerable differences in approach.

NetMeeting is a business-oriented, multiparty collaboration program that offers high-quality audio and efficient Windows application sharing. CoolTalk is a consumer-oriented Internet phone with somewhat sketchy audio quality, supported by some collaboration applications.

NetMeeting is clearly superior for business applications, and many consumers will prefer its higher audio quality even over CoolTalk's attractive voice mail feature. In the longer term, Mi-



crosoft's support for the rapidly coalescing International Telecommunications Union (ITU)

T.120 conferencing

■ standard promises compatibility with products from more than 20 other vendors.

CoolTalk users must pin their interoperability hopes on Netscape's own Internet Interactive

Collaboration Environment (IICE).

AUDIO CONFERENCING

Internet phones use lossy coder/decoder (codec) software algorithms to compress audio data prior to transmission and to decompress and play it at the receiving end. Audio quality is highly dependent on codec quality. Another key concern is the robustness of the technology during normal conversations across a full-duplex (two-way) connection. If your link is marred by frequent breaks, or audio gaps, conversations take on an uncomfortable CB radio-like feel.

Both CoolTalk and NetMeeting offer

OUR EDITORS REVIEWED 100,000 WEB SITES SO YOU WON'T HAVE TO!

LUCKMAN'S

OFFICIAL INTERACTIVE

World Wide Web

YELLOW PAGES

10,000 of the Best
Sites on the Web

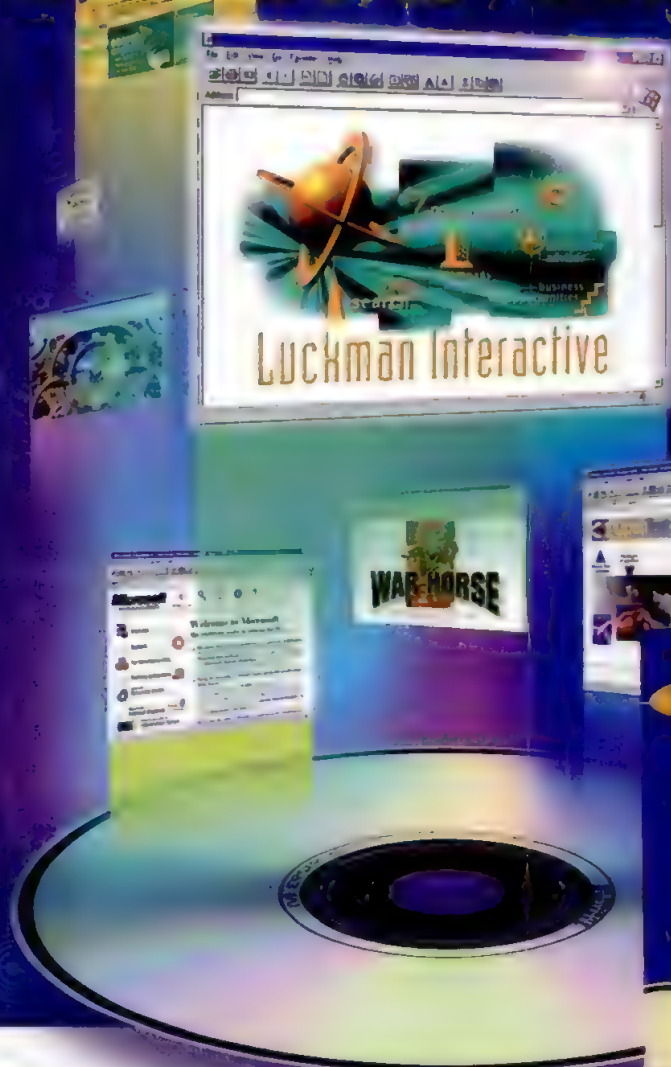
Site Ratings Include
Download Time

Detailed Site
Descriptions

Offline and Online
Searching

PC & Mac CD-ROM
\$59.00 street

Fast & easy access to the best of the Web!



Luckman's Official Interactive World Wide Web Yellow Pages™ is the easiest, most useful Web site directory available for the Internet. Of the more than 100,000 sites on the Web, our editors have found, reviewed, rated, and compiled over 10,000 of the very BEST.

A built-in search engine locates sites by category, name, description, keyword or site rating. A mouse click on the site name or URL automatically connects you to the Internet, launches your browser and takes you to the Web site.
Call today: 1-800-711-2676

E-Mail: info@luckman.com <http://www.luckman.com> 1055 West 7th Street, Los Angeles, CA 90017

Luckman Interactive, Inc.™

Browsers at the Crossroads



Fair	Internet phone	Excellent
Good	Text chat	Good
N/A	Application sharing	Excellent
N/A	File transfer	Good
Fair	Whiteboard	Good
Fair	Phone user listing	Good

N/A—Not applicable: The product does not have this feature.

Internet phone refers to voice quality over a 28.8-Kbps line and the absence of audio breaks or excessive dropouts during full-duplex conversation. **Text chat** covers the power and ease of text-based chat over a modem connection. **Application sharing** covers the ability of multiple conferees to view and control a Windows application running on a remote computer over a modem connection. **File transfer** covers the power and ease of file transfer over a modem connection. **Whiteboard** covers the ability to draw, mark, write, and annotate a whiteboard screen in near-real time. **Phone user listing** covers accessibility and ease of use of the vendor's publicly available listing of connected phone users.

multiple compression technologies for varying bandwidths. We tested them over connections ranging from 28.8 Kbps to 10 Mbps. To test robustness, we carried on a scripted two-way conversation over an Ethernet LAN, taping audio output at both ends to spot audio breaks.

In terms of pure quality, NetMeeting was superior at all bandwidths. At 28.8 Kbps and above, it produced audio that matched the quality of a long-distance call. More importantly, NetMeeting proved much more robust than CoolTalk, suffering very few noticeable breaks. CoolTalk conversations were marred by frequent audio breaks that forced us to speak slowly and carefully to make ourselves understood.

CoolTalk is one of the few Internet phones to offer answering-machine capabilities. While the feature worked as advertised, it's of limited value to those with dial-up Internet connections, since the connection must be active for callers to leave a message. Those with LAN-based connections to the Internet may find it useful.

Both products offer online directory listings of fellow users along with easy one-

button dialing. NetMeeting is also compatible with several third-party Internet white-page services, including Bigfoot Partners, Four11, InfoSpace, Coordinate.com, and WhoWhere. Microsoft's own listing servers are easier to access and more useful than Netscape's, having fields for e-mail address, first and last name, city/state, country, and comments, along with the ability to sort on any field. CoolTalk directory entries are limited to name and e-mail address, and the server was frequently too busy to access during our testing.

COLLABORATION TOOLS

Internet collaboration is a fairly new concept. The gamut of collaboration modules includes whiteboard products, text-based chat windows, and file-transfer utilities. Most impressive are application-sharing programs, which let several users share an application across an Internet link to work collectively on a document.

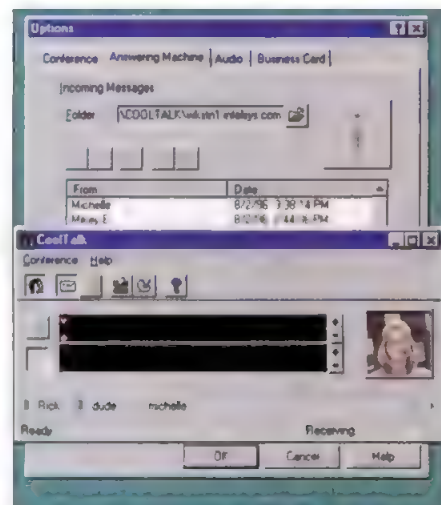
The first consideration in collaboration is scope: How many people can work together at one time? Where both products are limited to two-party audio communications, NetMeeting's other collaborative functions can be accessed by multiple participants. CoolTalk's modules are strictly two-party throughout.

Next to consider are the collaborative functions provided. Both products provide whiteboard and chat, but only NetMeeting offers application sharing and file transfer. Using NetMeeting, we were able to group-edit a memo written in Word, review an expense report in Excel, and contribute to a presentation developed in PowerPoint. The feature worked flawlessly at 28.8-Kbps bandwidths, opening application sharing to traveling co-workers.

Whiteboard utilities emulate the function of the ubiquitous conference-room whiteboard. NetMeeting's and CoolTalk's whiteboards resemble simple image-editing programs, and both

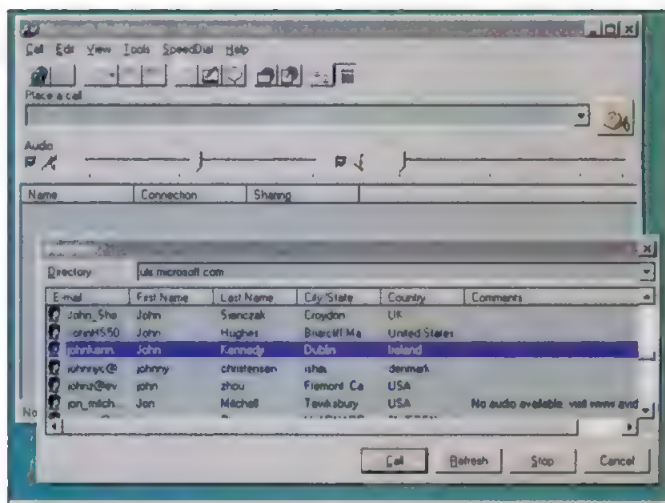
perform the same basic function, transmitting drawings, images, and annotations to other conferees in real time.

CoolTalk limits you to a single 640-by-480 surface, while NetMeeting supports multiple pages of much larger resolution. All annotations made in the CoolTalk canvas are final: You can erase, but you can't edit. In contrast, NetMeeting maintains all images and



Netscape's CoolTalk includes a point-to-point Internet telephone with answering-machine capabilities.

markings separately, so you can move them around without erasing. Differences between the products' chat utilities were much less significant, although NetMeeting has a slight edge. Overall, NetMeeting sets high standards for Internet collaboration, which CoolTalk must work hard to meet.



Users of the Internet telephone in Microsoft NetMeeting can find each other through listings on a Microsoft-maintained server.

7.9 billion miles of open highway
and you've got TotalAccess.™



\$19.95 flat rate*. Unlimited Internet mileage.



The coolest, easiest Internet access on Earth.

Every account includes e-mail and a free 2 meg Web site.

Call now for your EarthLink Network TotalAccess™
software with Netscape Navigator™ 2.0.

1-800-395-8425



Internet access in over 290 cities in the U.S. and Canada. Software for MACINTOSH, WINDOWS, WINDOWS 95, featuring Netscape Navigator 2.0. EarthLink Network is one of the largest Web space providers in the U.S. and also provides ISDN, Frame Relay, T1 and other Internet services. **There is a one-time set-up fee of \$25.00. Prices for Canada are different.*



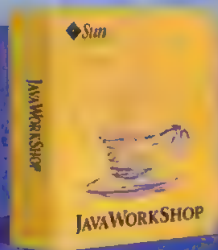
EarthLink Network, Inc. 3100 New York Drive, Pasadena, CA 91107 Fax: 818-296-2470
Info via email: info@earthlink.net Live human via email: sales@earthlink.net Visit our Web site at <http://www.earthlink.net>
CIRCLE 225 ON READER SERVICE CARD

Copyright © 1996 EarthLink Network, Inc. All Rights Reserved. Trademarks are property of their respective owners. Netscape Navigator and the Netscape Communications logo are trademarks of Netscape Communications Corporation. All other trademarks are the property of their respective owners.

* OFFER GOOD THRU 12-31-96 IN U.S. & CANADA ONLY. © 1996 SUN MICROSYSTEMS, INC. ALL RIGHTS RESERVED. SUN, SUN MICROSYSTEMS, SUN LOGO, SUNSOFT, JAVA, JAVA WORKSHOP, SOLARIS & THE NETWORK IS THE COMPUTER ARE TRADEMARKS OR REGISTERED TRADEMARKS OF SUN MICROSYSTEMS, INC. IN U.S. & OTHER COUNTRIES. **AJW15**



Java development tools from Sun



Leave it to the creators of the Java™ platform to give you Java™
Internet. Making it easier & faster to develop Java applications.

\$99* gets you Java WorkShop and all the upgrades for a year.

If you're not creating Internet applications on the Internet,
you're someplace you shouldn't be.



WorkShop™ The only way to create and test Internet applications where they'll run, on the
Plus it's written in Java, so you can develop on Solaris™, Windows 95 and Windows NT.

Contact 1-800-SUNSOFT or www.sun.com/developer-products/ THE NETWORK IS THE COMPUTER.



CIRCLE 335 ON READER SERVICE CARD

Add speed and sophistication to your search engine.



Introducing **EchoSearch**,™ the revolutionary new search accelerator.

In about the same time it takes to use one engine, EchoSearch harnesses *multiple* search engines such as WebCrawler, Lycos, Alta Vista and others. So you find what you want faster and easier.

EchoSearch also searches via *ideas*, rather than just words! Special linguistic programming selects and prioritizes the most relevant lists for your review.

You no longer pull up list after list of hits that are unrelated to what you're looking for – what a civilized idea!

At just **\$49.95** EchoSearch is the intelligent choice for prowling the Internet.

Download a full-featured free evaluation copy at

<http://www.iconovex.com/esm4/>

Or for credit card orders call

1-800-896-4212

(\$49.95 plus shipping & handling)



ICONOVEX
An Innovex Inc. Company

Software That Understands Ideas.

EchoSearch is a registered trademark of Iconovex Corporation, all other trademarks are property of their respective holders.

CIRCLE 024 ON READER SERVICE CARD

YOUR BROADCAST STATION TO THE INTERNET

LUCKMAN'S

WEB COMMANDER™

FULLY SECURE WEB SERVER • EASY TO SET UP • EASY TO USE

Full Security
S-HTTP and SSL

WebStudio
HTML authoring tool
including dozens of home
pages, templates & forms

Browsers
Microsoft Internet Explorer
Spyglass' Enhanced Mosaic

Image Map Editor

Real Time Monitoring
Reporting & Logging

ODBC Connectivity

Excite & WAIS Search engines

POP3/SMTP Mail server

Multi-Domain server

Web Tree graphically displays
all documents & links

PERL support

Automated credit card

The Java Developer's Kit



NOW

YOU CAN HAVE:

MORE EXPOSURE

MORE VISIBILITY

MORE BUSINESS

BY PUBLISHING

ON THE WEB

Web Commander has it all.

Completely wizard driven, Web Commander is the fastest, easiest to configure server software on the market with all the tools for fully secure business on the Internet.



Luckman Interactive, Inc.

Call Today:

1-800-711-2676

E-Mail: info@luckman.com

<http://www.luckman.com>

1955 West 7th Street, Los Angeles, CA 90024

CIRCLE 606 ON READER SERVICE CARD



SLmail95



If you could
drive all your
TCP/IP applications
through one
easy-to-use interface,
what would you have?

Time to do your job.

tcpCONNECT4™

Check it out.

www.intercon.com/200/

Network managers everywhere are finding life more manageable thanks to InterCon's new tcpCONNECT4™ Communications Environment. CONNECT4 integrates the configuration and operation of everything from email and Web browsing to file sharing and terminal emulation under one simple, intuitive

interface for both Windows and Mac. Training and support are radically reduced. Users become more productive. Call InterCon at 1-800-468-7266, dept. 200 or visit our Web site for a free trial copy. The tcpCONNECT4 Communications Environment from InterCon. Do less work, get more done.

©1998 InterCon Systems Corporation. All rights reserved. tcpCONNECT4 is a trademark of InterCon Systems Corporation.

MAIL AND NEWS

Internet mail and Usenet news clients aren't the highlights of either browser. But they're well integrated, functional, and likely to get better. Here's what they offer.

By Amarendra Singh

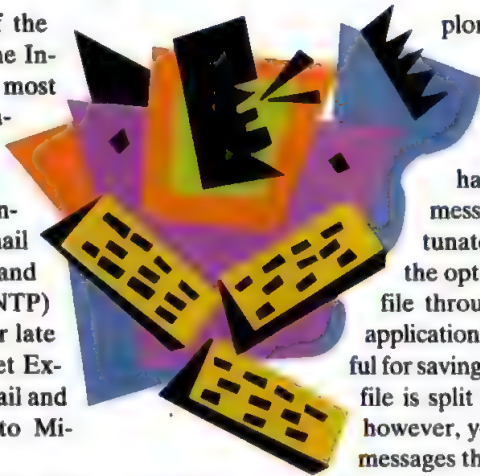
In recognition of the importance of the Internet's two most widely used applications, Netscape Navigator 2.0 was the first browser to integrate Internet mail (POP3/SMTP) and Usenet news (NNTP) clients. Now, better late than never, Internet Explorer 3.0 brings mail and news capabilities to Microsoft's browser.

Neither company's offerings will take the place of full-featured Internet mail and news applications. But both companies include mail and news capabilities free with their browsers, and both deliver basic functionality with the occasional nice twist.

The mail and news clients included in Navigator 3.0, although not significantly enhanced beyond the previous version, exhibit an intriguing HTML-centric conception that is not yet strongly implemented. Microsoft's clients push the envelope less but are somewhat more polished in their current state.

Both sets of mail and news clients are designed to look and feel very much like the companies' respective browsers. Both use a three-pane interface to display different message elements. Navigator's clients do not allow you to remove any of these elements; Internet Explorer's clients let you hide all but the message headers. To view postings, you highlight a message header; the message's contents are displayed in the message pane.

The two browsers' mail and news clients have many family resemblances and common features. Within Internet Ex-



plorer, messages containing an attachment appear with a paper-clip icon on the upper right-hand corner of the message window. Unfortunately, you have only the option of executing the file through the appropriate application. That's not very useful for saving executable files. If a file is split into multiple parts, however, you can select all the messages that comprise the file, decode them, and then save the resulting file. Netscape offers you the options of viewing attachments in-line or as an icon in the message pane.

Both browsers' news clients let you specify the number of message subject headers you want to download. The Internet Explorer client makes it easy to load additional messages by choosing a menu option; in Navigator, you need to close and then reload the group. The Navigator client provides greater control over the amount of detail shown in NNTP message headers, such as where a message was cross-posted and from what news server it originated. Most of the reply options, such as replying to all and including the original message in the reply, are standard. Neither mail client supports mailing lists or blind copies. Internet Explorer has limited sorting capabilities in its mail facility.

Navigator's news reader dedicates a certain amount of screen real estate to listing all newsgroups. The Internet Explorer news reader, called Microsoft Internet News, displays the list in a separate window, thus saving space. The downside of this approach is that you have to launch

a separate dialog to view unsubscribed groups. The dialog provides a tabbed dialog box to differentiate among the full list of newsgroups, the lists to which you have subscribed, and the new groups on your server. Internet Explorer's news reader offers superior off-line browsing. You can mark headers for later retrieval or create batch posts for specific groups.

RICH MAIL

Both Microsoft and Netscape say their mail clients support HTML, a somewhat vague and confusing claim. Navigator's mail client can view HTML attachments in-line with the actual message, but it cannot directly create HTML mail. Both packages can turn an embedded URL into an active link. Internet Explorer's client supports rich text, which it can convert to a basic HTML equivalent, but you can't insert images or use advanced HTML features.

Ultimately, the mail and news offerings from both companies fall short of the mark, while holding out the promise of something better. We'd like to see full HTML creation added to the Navigator clients' HTML-viewing capability. And we'd like to see Internet Explorer's weak HTML creation and rendering facilities beefed up to cover the full range of formatting possibilities. □



Excellent	Browser integration	Good
Poor	Message management	Fair
Fair	Newsgroup management	Good
N/A*	Off-line news reading	Fair
Fair	Rich messaging	Fair

N/A—Not applicable. The product does not have this feature.

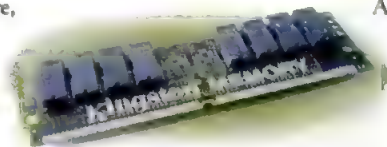
Browser integration covers the quality of integration between the mail and news clients and the host browser. **Message management** covers the mail package's ability to organize and manage mail and filter messages. **Newsgroup management** covers the ease with which the news client lets you access, view, and subscribe to newsgroups. **Off-line news reading** covers features that let you work with newsgroups while not connected to the Internet. **Rich messaging** covers the ability of the mail package to create and view HTML and other rich-text messages, view complex HTML in-line, and access hyperlinks.



KINGSTON MEMORY.
BECAUSE SOMETIMES TECH SUPPORT
ISN'T JUST DOWN THE HALL.



When you're out in the middle of nowhere, you've got to be sure the memory in your laptop is reliable. That's why you need Kingston.[®] As the world's leading independent manufacturer of memory, we make customized memory for just about every laptop out there, including: Compaq,[®] IBM,[®] Hewlett-Packard,[®] Toshiba,[®] and Apple.[®] Our engineers use the same components and specifications that the system manufacturers use.



And we test every cell on every chip on every module—so reliability and compatibility are assured. Of course, we also throw in a lifetime guarantee. Despite its extraordinary quality, our memory costs up to 50% less than the system manufacturers' brand. To find the Kingston distributor nearest you, call (800) 337-3806. We have the right memory for any office environment.

Kingston
TECHNOLOGY CORPORATION

For more information call us at (800) 337-3806



Visit our Web site: <http://www.kingston.com/pcm.htm>

A Spectrum of Choices

Color printers are better and more affordable than ever. We review two dozen business and high-end printers designed to suit every need.

By M. David Stone

Color printers keep moving onto center stage. In the business mainstream, color charts and graphs are now commonplace in reports and presentations. Engineering and design departments in manufacturing companies find it easier to work with product diagrams and mock-ups in color. At the high end of the spectrum, where graphic artists toil and advertising agencies need to please clients, a growing number of relatively affordable printers can serve as proofing tools. They can show what a color ad or layout will look like when printed.

IN THIS REVIEW

Digital Colorwriter LSR 2000	150	IBM Network Color Printer	162	Tektronix Phaser 440	195
Eastman Kodak Digital Science		Lexmark Color Jetprinter 4079 Plus	183	Tektronix Phaser 480X	195
8650 PS	187	Lexmark Optra C	167	Tektronix Phaser 550	175
Epson Stylus 1500	179	Mitsubishi S3600-40U	192	Xerox XPrint Plus 4915	177
Epson Stylus Pro XL	179	Mitsubishi S6600-40U	192	Xerox XPrint Plus 4920	177
Fargo Pictura 310e	188	QMS magicolor CX/40	167	Editors' Choice	142
Fargo PrimeraPro	188	QMS magicolor WX	167	Color Printing Glossary	146
HP Color LaserJet 5M	150	Seiko ColorPoint 835 PS	195	Guide to Color Output	154
HP CopyJet M	182	Tektronix Phaser 240	186	Performance Tests	170
HP DeskJet 1600CM	182	Tektronix Phaser 350	175	Summary of Features	182

A Color Printer for Every Need

Color printouts are becoming more commonplace in the business environment. Color charts and graphics in reports and presentations communicate ideas better, and graphics pros can create near-perfect color proofs.

COLOR LASERS

Output quality: Rich, well-saturated colors, with very little graininess.
Speed: 3 ppm for color; 10 ppm for monochrome documents.
Cost: \$3,500 to \$10,000. Cost per printed page: 8 cents color; 3 cents monochrome.
Target markets: Business workgroups and departments.
Applications: Presentations, reports, newsletters, color spreadsheets.

HIGH-END INK JET

Output quality: Rich, well-saturated colors with near-photographic quality on premium paper. More washed-out colors, banding, and graininess on plain paper.
Speed: 1 to 4 ppm for color; 3 to 9 ppm for monochrome documents.
Cost: \$2,500. Cost per printed page: 12 cents color; 3 cents monochrome.
Target markets: Business workgroups and departments.
Applications: Presentations, reports, layouts, color comps

PERSONAL INK JETS (REVIEWED NEXT ISSUE)

Output quality: Rich, well-saturated colors with near-photographic quality on premium paper. More washed-out colors, banding and graininess on plain paper.
Speed: 1 ppm for color; 4 ppm for monochrome documents.
Cost: \$200 to \$500. Cost per printed page: 10 cents color; 3 cents monochrome.
Target markets: Individual business users, home users, students.
Applications: Word processing documents, spreadsheets, reports, newsletters, flyers, specialty output (greeting cards, brochures, crafts).

THERMAL WAX TRANSFER

Output quality: Rich, well-saturated colors, with some dithering.
Speed: 2 ppm for color.
Cost: \$3,400. Cost per printed page: 55 cents color or monochrome.
Target markets: Business workgroups and departments.
Applications: Presentations, reports, overhead transparencies.

THERMAL DYE TRANSFER

Output quality: Rich, accurate colors, true photographic-quality output.
Speed: 0.5 ppm for color.
Cost: \$1,500 to \$15,000. Cost per printed page: \$2.50 to \$9.75.
Target markets: Graphic artists and prepress workgroups.
Applications: Color comps of layouts and final artwork

The big news this year is that color laser printers have come of age, with output that can be quite good if not yet photorealistic. Given street prices of \$3,600 and up (mostly up), they don't make fiscal sense for every business, but any department that sends a lot of jobs to a color laser copy shop should look into adding a color laser to its network.

In years past, we covered all manner of printers in a single-issue fall blockbuster. This year we're covering business color

printers in this issue and personal printers in the next issue.

REVIEW CRITERIA

For this roundup, we gathered color printers that are aimed at workgroups and graphic artists in the business world and whose street prices are less than \$16,000. We review printers new to the market since our last roundup of graphics printers, though we invited back past Editors' Choice winners to see how they

LASER

- High-volume color: Tektronix Phaser 550
- Affordable color: Tektronix Phaser 350



While all of the laser-class printers in this review balance output quality, performance, and price well, two machines stand out and deserve Editors' Choice honors. The Tektronix Phaser 550 (\$6,300 street) produced the best output we've yet seen from a color laser printer, both in its standard 600-dpi mode and in its highest, 1,200-dpi mode.

Business graphics emerge with sharp edges and smooth gradient fills, and photos are just one step shy of photographic quality. The Phaser 550 was also among the fastest performers on our throughput tests, making it well suited to high-traffic network environments.

Our second Editors' Choice is also from Tektronix, but it isn't a laser printer. The Phaser 350 (\$3,150 street) uses solid-ink technology to deliver brilliant color. Its 300-dpi resolution produces more noticeable graininess on photos, but graphics show sharp edges, solid lines, completely filled in areas of color, and gradients free of banding. Performance is on a par with that of color lasers. Best of all, the Phaser 350 costs half the price of a similarly configured laser printer.

The HP Color LaserJet 5M and QMS magicolor WX both deserve honorable mentions. The HP's networking utilities are the best in its class. Its 600-dpi output is fine for business use, performance is good, and the street price (\$7,400 fully configured) is attractive. Even more affordable is the magicolor WX. This unique printer is akin to a GDI printer, using the host PC's resources to process the image. This lets QMS deliver a creditable laser for around \$3,600 on the street.



Tektronix Phaser 550

would compare. We didn't rule out any printing technology, though we will not cover personal ink jets and personal monochrome laser printers until our next issue. We covered one other category, networked laser printers, in our issue of June 11, 1996. Since memory and options vary so widely, we let each vendor submit the configuration that would best represent the product.

The 24 printers in this roundup employ five technologies: laser, solid ink, ink jet,

INK JET

• Epson Stylus Pro XL



The Epson Stylus Pro XL (\$2,000 street) wins our Editors' Choice among the tabloid-size ink jets. It offers excellent 720-dpi resolution on both plain and coated paper (up to 11 inches by 17 inches) and can print at 360-dpi resolution for draft work. On Epson's special 720-dpi paper, output very nearly approached true photographic quality. Print times for color-intensive files at this resolution were slower than we would have liked—sometimes half an hour per tabloid-size page—but graphic artists who need an inexpensive tool for large-format color comps may not mind the wait. The only alternatives right now are buying a \$5,000 thermal dye printer and sending the job out to a service bureau. And in 360-dpi mode, print times were on a par with those of other tabloid-size devices. Output quality cannot match that from a thermal dye proofer, but the Epson presents an affordable alternative.



The HP DeskJet 1600CM (\$2,000 street) warrants an honorable mention in the business segment. Designed to be shared on a network, this letter-size ink jet is quick, and less expensive than a color laser printer. Its 600-dpi text output is excellent, but color image quality (at only 300-dpi resolution) lags behind that of competing color lasers. Still, some offices may find the output adequate, and its relatively low price will put it within reach for many businesses.

One other printer in this category is worthy of note. Tabloid-size output from the Lexmark Color Jetprinter 4079 Plus (\$2,600 street) is not as stunning as that of its rival from Epson, but the simple setup routine and MarkVision administration utility make Lexmark's printer easy to configure and use in a network environment.

thermal wax transfer, and thermal dye transfer (sometimes called dye sublimation). To help you find the class of printer that best fits your needs, we have grouped the reviews into three sections, based on a combination of the technology and the intended purpose:

- nine color lasers and one solid-ink printer;
- five ink jets and one dedicated thermal wax printer;
- eight thermal dye printers, three of

which are thermal dye/thermal wax dual-mode units.

The nine laser printers came from seven vendors: Digital Equipment Corp., Hewlett-Packard, IBM, Lexmark, QMS, Tektronix, and Xerox. Two new entries weren't shipping in time for this roundup. Panasonic's KX-P8475 is virtually identical to the Tektronix Phaser 550, which we review here. The Canon LBP 360PS employs the same engine and controller as the Digital, IBM, and Lexmark

THERMAL DYE TRANSFER

• Seiko ColorPoint 835 PS



The best of a good lot in this roundup is the Seiko ColorPoint 835 PS (\$15,500 street), which wins our Editors' Choice. Output from the tabloid-capable ColorPoint was a step ahead of the output of other thermal dye printers we tested. Photos show full detail and shading, and graphics emerge with brilliant colors, sharp edges, and continuous-tone gradient fills. In some ways, the ColorPoint's output was better than that of a production-level prepress proofer costing many times more. The ColorPoint can print in thermal wax transfer mode as well as thermal dye mode, so graphics users can produce drafts more quickly and less expensively.

Note that all the printers we reviewed in this category are strong contenders. Output from the Kodak Digital Science 8650 PS (\$9,000 street), Mitsubishi S6600-40U (\$12,000 street) and S3600-40U (\$8,500 street), and Tektronix Phaser 440 (\$7,200 street) and Phaser 480X (\$9,000 street) was also superb, barely a notch below that of the Seiko. The Kodak unit was the fastest in this group but costs more than the other A-size units. The Mitsubishi pair did particularly well at reproducing flesh tones. And the Tektronix printers, both Editors' Choice winners in this feature last year, are still fine choices, though the new Seiko edges them out in terms of print quality. The letter-size Fargo PrimeraPro (\$1,500 street) and tabloid-size Fargo Pictura 310e (\$5,000 street) are worth a look for budget-constrained users. Though their output is not as good as that of the others mentioned here, it is still adequate for most proofing tasks. Because of their host-based designs, the two Fargo units cost significantly less than their competitors do, letting small graphics departments or solo shops step up to thermal dye output.



laser printers we review.

We grouped the lone solid-ink printer, the Tektronix 350, with the laser printers because it is so similar in speed, output quality, and function that Tektronix calls it a laser-class printer and sells it as a budget laser (\$3,495 list, \$3,150 street). Tektronix missed sending us a second solid-ink printer, the Phaser 300X (\$7,995 list, \$7,200 street), in time for review. It is not a laser-class printer but is a tabloid-size machine aimed at

Color Printers

graphic artists and intended to compete with thermal dye units.

In the ink jet category, the Epson and Lexmark printers can produce tabloid-size output, and graphic artists can use them for producing color comps. (Canon also offers an affordable tabloid-size ink jet, the \$499 BJC-4550, but the company wasn't able to send us a final version in time for review.) The HP ink jets are letter-size printers intended for a work-group environment, with the focus on business rather than graphic arts output. The HP CopyJet M adds the convenience of a walk-up copier. With these we've grouped the only exclusively thermal wax printer in this review, the Tektronix Phaser 240, which the company aims at the business market and intends for producing presentations, especially overhead transparencies.

Our third group is the thermal dye printers, dedicated solely to producing photographic-quality output for final prepress color comps or for final artwork. We tested eight printers, from Fargo, Kodak, Mitsubishi, Seiko, and Tektronix. The Fargo and Seiko machines also offer thermal wax modes for draft output.

Five additional units in this category weren't available in time for review but will be out by the time you read this. Seiko will have two more new printers; Shinko Technologies submitted pre-production versions of its ColorStream printers, which we cover in a sidebar. Finally, Mitsubishi will offer the G3600, a next-generation thermal wax printer whose output, Mitsubishi contends, rivals that of thermal dyes.

TECHNOLOGY PRIMER

Most laser, ink jet, and thermal wax printers are *bilevel*, which means that the printer's colors—cyan, magenta, yellow, and black—can be only fully on or fully off. (See the accompanying glossary for other terminology.) This allows a maximum of eight possible colors for any given dot—any of the four printer colors or red (magenta plus yellow), green (yellow plus cyan), blue (cyan plus magenta), or white (no ink). The printer simulates any other colors through *dithering*—mixing dots using the eight available colors. In some cases dithering fools your eye

into seeing a color that's not there. In others, you can see the dithering as an obvious pattern of dots.

Continuous-tone printers, such as thermal dye units, don't use dithering. Instead they can print each of the 3 primary colors (cyan, magenta, and yellow) in any of 256 shades, combining them to print a dot in any of 16.7 million colors (256 x 256 x 256). That's enough so that if it works correctly, you can't detect sharp changes in a photo or graphic that shades from one color to another.

Color laser printers are coming on strong. This year's crop have addressed the output shortcomings of a year ago.



Contone printers, sometimes called *multilevel printers* (but not to be confused with continuous-tone units), offer more shades than bilevel printers but fewer than continuous-tone machines. The Canon engine in the reviewed Digital, IBM, and Lexmark laser printers, for example, offers four visibly different shades for each of the 3 primary colors. This works out to 64 possible colors (4 x 4 x 4) for each dot. With such a wide choice of colors for individual dots, printers can fake additional colors using fewer dots and therefore create much less obvious dithering patterns. All other things being equal, this can make the output closer to photographic quality. But contone is still not continuous-tone.

COLOR LASER

Color laser printers are coming on strong. A year ago, there wasn't a single color laser printer whose output didn't show obvious shortcomings. This year's crop have, in general, managed to tone down those problems where they still exist. And you can find color lasers that you can use with no apologies needed. Prices are also lower this year, with street prices ranging from \$3,600 to \$9,000.

Because color lasers print on plain copier paper, you can easily and inexpensively mix color and monochrome in the same print job or on the same page. This makes such printers ideal for color presentations or for newsletters, where your audience expects laser-quality text. In general, you'll see acceptably saturated colors for graphics from most laser printers; all the units we tested did at least a good job on our sample slide presentation. The Digital, IBM, Lexmark, and Tektronix lasers can also give you output approaching true photographic quality for photos.

Be aware that printers based on the Hitachi engine—both QMS printers and both Xerox units reviewed here—tend to leave a slightly darkened line along the edges of solid blocks of color. Conversely, printers based on the Canon engine (Digital, IBM, and Lexmark) tend to leave thin white lines between colors. These effects don't show up on all images, but when they do they can be objectionable. The KME engine in our Editors' Choice Tektronix Phaser 550 and the Konica engine in the HP Color LaserJet 5M don't have such problems.

Cost per page is an important consideration, especially if you will be producing color documents in any quantity. You shouldn't take the vendors' claimed cost per page too seriously when comparing laser printers (or ink jets, for that matter). There's no standard for computing the price, which means that every vendor is free to determine it differently. Vendors may assume different percentages of each toner for any given coverage and may either include or leave out such consumables as the photoconductor, fuser, and fuser oil.

The figures that vendors gave us vary significantly. HP claims just 1.8 cents per monochrome text page for the HP Color LaserJet 5M, while other color laser vendors claim up to 5 cents per monochrome page. Similarly, claims range from 3.3 to 15 cents for a color page with 10 percent coverage, and from 25 to 57 cents a page for color with 75 percent coverage.

All told, color lasers are now grown up and ready for the real world. If you look carefully, you can find one that will let you print good-looking color graphics and

“

OKAY,
SO THIS IS THE FUTURE
OF THE ENTERPRISE.

”

and multi-tasked & High technology will
take pos-
a new
genera-
for dis-
ed appli-
We
his 'digi-
omput-
and it
be the
ary most
ificant
chnology
novation
for cus-
as we
ach the
of
ecade."
puting
ns direc-
services
the Net
founda-
tor dis-
ed com-
ss-
Work
ns and
se they
nable a
more
logical linear
tems directory ser-

"Directory Services will
be the foundation for dis-
tributed computing sys-
tems. And because they
will enable a new, more
logical approach to net-
work implementation and
use, directories will have
a dramatic impact for the
better on the way net-
works are used and man-
aged. They will also make
possible a new generation
for distributed applica-
tions. We call this 'direc-
tory-enabled computing',
and it will be the most
significant technology
issue for customers as we
approach the end of the
decade."

GLOSSARY

Color Printing Terms

Banding The presence of visible bands in a printout. For instance, ink jet printers sometimes create bands that reflect the path of the printhead in successive sweeps across the page.



Bilevel printer A unit that can print any of three primary colors—cyan, yellow, and magenta—on only two levels, on or off. It can combine them to print a dot in any of eight colors. In order to produce any other colors, it has to simulate them through dithering.

Color comp (also called *color proof*) A printout used for approximating how an image will look when printed on a printing press.

Continuous-tone printer A unit that can print any of 3 primary printer colors (cyan, yellow, and magenta) in 256 shades, for a total of 16.7 million colors.

Contone printer (also called a *multilevel printer*) A

photos on plain paper and easily add color to monochrome documents. That makes lasers a good choice for mainstream business use, though still not appropriate for serious graphics work.

SOLID INK

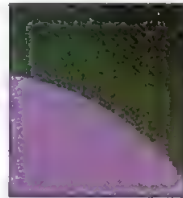
Solid-ink printers, which you can think of as “wax jets,” come in two varieties. The classic design, which you’ll find in the Tektronix machine that wasn’t ready in time for review, the Phaser 300X, works like an ink jet. The printer melts the solid wax and then sprays liquid wax onto the page, where it dries by cooling. These versions are slow and are aimed squarely at graphic artists.

Our Contributors: M. DAVID STONE is a contributing editor at *PC Magazine* and author of *The Underground Guide to Color Printers* (Addison-Wesley, 1996). DANIEL GROTTA and SALLY WIENER GROTTA are frequent contributors and the authors of *Digital Imaging for Visual Artists* (McGraw-Hill, 1996). LORI GRUNIN and JAMES KARNEY are frequent contributors to the magazine. DENIS TOM is a technical analyst at the magazine. Associate editor JAMIE M. BSALES was the editor in charge of this story, and JEFF MACE was the project leader.

unit that offers more shades than a bilevel printer but fewer than a continuous-tone printer.

Dithering Simulating varying shades in a printout by mixing different-colored dots.

Error diffusion dither (also called *FM screening* or *stochastic screening*) The simulation of varying shades in a printout by mixing standard-size spots composed of multiple dots and varying the number of dots. This technique places the dots with some randomness to avoid a regular tiled pattern, resulting in a grainy appearance instead. Error diffusion dither is particularly well suited to printing photos.



Four-color printing (also called *CMYK printing*) The use of three primary colors (cyan, magenta, and yellow) and black to create other printer colors through various mixtures. *Three-color printing* uses only the primary colors, combining them to create black.

Gradient fill An area in a graphic that shifts

The more recent variation, which you’ll find in the Tektronix Phaser 350, reviewed here, sprays the wax on a drum and rolls the paper against the drum, much like an offset printing press or a laser printer. Also like a laser, it prints on plain copier paper, and it has laser-like speed, color quality, and crispness of edges and text.

The Phaser 350 doesn’t offer the high resolution you can obtain with a color laser, which means that you’ll see dithering patterns in graphics and photos. But it costs less than the least expensive color laser (\$3,150 street), and its claimed cost per color page is also lower, ranging from 5 cents for 10 percent coverage to 27 cents

gradually from light to dark or from one color to another.

Host-based printer (also called *GDI printer*) A printer that relies largely on the host PC’s CPU for image processing.

Letter-size printer (also called *A-size printer*) A unit able to print on pages up to 8.5 inches wide by 11 inches long. The term may refer to a unit that can also print on legal-size paper (8.5 inches wide by 14 inches long) or on slightly larger paper. (The latter is also called a *super A-size printer*.)

Posterization The undesired conversion of smooth color changes, as in a photo of a sky or human skin, into highly visible, abrupt shifts.



Tabloid-size printer (also called *B-size printer*) In a technical sense, a unit able to print on pages up to 11 inches high by 17 inches wide. The term often refers generically to a *super B-size printer*, which can handle slightly larger formats as well.

for 75 percent coverage. Consider laser-class solid ink printers if you want the advantages of printing on plain paper to mix text and graphics, if you want them at budget prices, and if you can live with the dithering patterns.

HIGH-END INK JETS

The ink jet printers in this overview fall into two categories—high-end letter-size printers and tabloid (or larger) printers. The key advantage of both categories is price: Ink jet printers are less expensive than lasers to buy and run.

With all five reviewed ink jets, you can count on saturated colors for graphics; photographic images range from decent to excellent. You’ll obtain usable results on copier paper, markedly better results on coated ink jet stock (about 10 cents per sheet), and the best on glossy paper (75 cents per sheet). While cost-per-page figures are lower for ink jets than for lasers when you use copier paper, ink jet printing becomes more costly if you use the

OKAY, SO NOVELL

FOUND A FEW ANALYSTS WHO
SHARE ITS VISION.

BUT THAT DOESN'T MEAN
REAL WORLD CUSTOMERS WILL.

"Novell is really
positioning NDS
as a specific
Internet or
client/server
distributed set
of products
not tied
to NetWare."

LEE DOYLE, IDC

"NetWare 4's momentum
is driven in part
by customers' demand
for NDS...
NDS provides leading
directory services for
distributed networks."
Lee Doyle, IDC

"Most notably,
NT Server lacks a
comprehensive
directory service. By
contrast NetWare
provides most of the
capabilities necessary
in a large-enterprise
network operating
system - especially in
Novell Directory
Services (NDS)."

Gartner Group

develop the latest computations a
groups Computing systems divi
the Net Work foundation

better paper—which you will want to do for best quality.

Think of the high-end, letter-size ink jets reviewed here—the HP DeskJet 1600 CM and the HP CopyJet M—as the poor man's color lasers, with lower output quality but with near-laser speeds (or faster-than-laser speeds for some files) at less cost—\$2,000 to \$2,500 on the street. They are best suited for business documents that mix monochrome and color on a single page.

The second class of high-end ink jet in this roundup consists of the tabloid-capable printers: the Epson Stylus Pro XL and Stylus 1500 and the Lexmark Color Jetprinter 4079 Plus. They range in street price from \$1,100 to \$2,600 and are aimed primarily at graphic artists who need the large size to proof large images—for example, left- and right-facing pages in a magazine layout. In this regard, these printers compete more with B-size thermal wax or even thermal dye printers, though their output quality isn't in the same class as that of the latter. Epson's Stylus 1500 is actually a C-size printer that can handle paper sizes of up to 17 by 22 inches; it is meant for shared use by a small workgroup that needs wide-carriage monochrome output (such as ledgers) and business-quality color.

Though ink jet output quality isn't in remotely the same class as thermal dye output, it is good enough for proofing layouts as to position and approximate color, in small art departments or solo shops that can't afford the minimum \$5,000 price tag of a tabloid-size thermal wax printer. The Epson Stylus Pro XL, our Editors' Choice in this category, produced stunning output in its 720-dpi photo mode with high-quality paper.

THERMAL WAX

Thermal wax transfer printers roll a wax-coated ribbon against paper and heat the ribbon to melt the wax and transfer it to the page. The result is brilliant color for graphics and crisp edges but, for all current thermal wax printers, obvious dithering patterns.

One important strike against thermal wax is that these printers normally use a special coated paper. Some, including the Tektronix Phaser 240, reviewed here, can use plain paper by laying down a special

coat to which the wax can stick. But the extra coat takes extra time, and it's available only with a three-color ribbon, which means that black tends to be slightly brownish. With either approach, expect to pay 50 to 60 cents per page for letter-size paper, and expect performance to be similar to a fast thermal dye printer's.

At the moment, thermal wax printers are on the endangered species list, relegated to a niche for printing transparen-

The best thermal dye printers offer true photographic-quality output indistinguishable from a photo.



cies, which they still do as well as or better than other technologies. But even here they are losing ground to laser, laser-class, and even ink jet printers, all of which can do a creditable job of producing transparencies and are versatile enough for other tasks as well.

Don't count this technology out yet, however. At least one manufacturer has an innovative thermal wax printer waiting in the wings. The Mitsubishi G6800, which wasn't available in time for review, is a multilevel printer with 64 shades for each available color, or roughly 262,000 possible colors for any dot, rather than the usual 8. That means it can use much less obvious dithering patterns than current thermal wax printers, which should increase image quality dramatically and may revive this technology. Stay tuned for further developments.

THERMAL DYE

Thermal dye printers are mechanically similar to thermal wax printers, in that they roll a ribbon against a sheet of paper and apply heat to transfer the image to the paper. But that's where the resemblance ends. Thermal dye printers employ dye instead of wax, and they use polyester-coated paper that creates much the same look and feel as a photograph. More im-

portant, they offer true continuous-tone printing—16.7 million colors, with no dithering.

The best thermal dye printers offer true photographic-quality output indistinguishable from a photo, with color control that makes them appropriate for prepress proofs. All eight thermal dye printers in this review did an excellent job producing our output samples. The tabloid-size Mitsubishi S6600-40U, Seiko ColorPoint 835 PS (our Editors' Choice), and Tektronix Phaser 480X, as well as the letter-size Kodak Digital Science 8650 PS, Mitsubishi S3600-40U, and Tektronix Phaser 440 all stood out as reasonably capable desktop proofers. And even the least capable thermal dye printer offers output that compares well with that of printers using other technologies. This is why thermal dye printers are the first choice of graphics professionals, for whom cost is secondary to color fidelity.

Thermal dye printers are inherently slow, because they have to run the paper through the printer once for each color on the ribbon. For a complex graphic or photo, however, image-processing time can be much more important than actual printing time. With their computing horsepower, the thermal dye printers generally process such images more quickly than a typical color laser, which is why the fastest thermal dye printers were not far behind lasers in our tests. Do note that while three of the printers offer 600- by 300-dpi modes (as opposed to the standard 300-by-300 resolution), Fargo and Mitsubishi suggested that we use the default 300-dpi settings, since the slight gain in image quality probably wouldn't be worth the extra time needed to print.

Alas, the high output quality costs money. Thermal dye machines are the most expensive category of printers, with full-function letter-size units ranging from \$7,200 to \$9,500 (street) and full-function tabloid-size printers ranging from \$9,000 to \$15,500 (street). Even the stripped-down Fargo units, which use the computer for all processing, have street prices of \$1,500 for the letter-size version and \$5,000 for the tabloid-size one.

The cost per page is also high. The least expensive tabloid-size thermal dye page is \$6.50—and the price is the same for any page, because the printer uses the

"It's simple. It does the work. Without NDS, I do the work."
ERIC GORDEN
SENIOR SOFTWARE
ENGINEER
TOURTEL INC

CHIEF TECHNOLOGY
OFFICER
GMAC MID-TRAGE
"For our purposes, we needed one place for all the network information. We went to NetWare 4 because of NDS. It's great to have a central NDS server to do all of the management."

"NDS allows us to manage large or small network environments much easier and faster from a single console due to its network-centric design."
J DOUGLAS CROWDER,
VICE PRESIDENT & NETWORK ARCHITECT,
INTEROPERABILITY SOLUTIONS GROUP,
TUSCON, AZ

MIKAELE RACINE,
MANAGER OF CLIENT SERVER
TECHNICAL SUPPORT
ROHN AND HAAS COMPANY
Novell Directory Services makes
our global 10,000 node network to
look like one enterprise LAN.
Standardizing on NetWare 4 as our
NOS made our global migration
easy to plan, roll out, and manage.
We gained immediate benefits from
NDS when we installed it at the first
of our 80 sites and we continue to
leverage it. Our businesses now
have better access and control of
their data. NDS allows us to admin-
ister our LAN today from any desk-
top with fewer people. We have
found NDS to be robust and stable.
Basically, NetWare 4 works!"

Oh.

"The expressive
power of NetWare 4.1 is
the directory service. I can
now create objects or users,
log-in scripts, passwords,
etc. from one location. With
servers all over the country,
I have the ability to assign
rights to people wherever
they are. No doubt about
it, this has made my life
much simpler."

"...enables our
users to access
information and
resources across
the enterprise with
a single log-in."

DENNIS OLSON
SENIOR NETWORK
SYSTEMS ANALYST
ROCKWELL AUTOMATION
ALLEN BRADLEY

"At Lawrenceville, it's
for us to assign unique access
privileges to each group of
students, faculty, and staff -
more than 1,000 users. With
NDS, that task is simple and
straightforward. It's one thing
we don't have to worry about."

Susan Riederer
Chief Information Officer
The Lawrence School
Lawrenceville, New Jersey

"...and maintain the
network from a
centralized
standpoint and
it allows users
to log in once
to access all
the resources in
the network."

"NDS allows us to man-
age this system more
efficiently because now
users are able to get to
the applications no mat-
ter where they are."

...technology innova-
tions as we approach
the next decade. Comput-
ing will be

Like to see even more proof of Novell's superiority? Call us at 1-800-219-1700
to receive our Novell Directory Services™ Test Drive CD-ROM. Or visit us at
www.novell.com/nds. You'll be impressed. And you can quote us on that.

Novell Directory
Services™

Novell®
Everything's Connected.™

same amount of ribbon no matter how much color it lays down. (The same is true of thermal wax.)

DUAL-MODE PRINTERS

Dual-mode printers take advantage of the mechanical similarities between thermal wax and thermal dye technology to offer both choices in one printer. This lets you use the less expensive thermal wax mode for drafts and save the more expensive thermal dye mode for final output—which can save you up to thousands of dollars per year. You have to switch ribbons and media when you go from one mode to the other, though most printer designs make this an easy task.

In this roundup, the tabloid-size Fargo Pictura 310e and Seiko Color-Point 835 PS offer dual-mode printing, as does the letter-size Fargo PrimeraPro. This Fargo, a past Editors' Choice winner, is more appropriate for individual use than for a small workgroup. At just \$1,500 on the street, it's the most affordable choice in this year's crop of thermal dye printers.

SOME FINAL NOTES

There are some thoughts you should keep in mind for any of these technologies. First, we ran all our performance tests using parallel-port connections. All of these printers, including the ink jets, offer network support as well, either standard or as an option, and most would perform better over a network. All the units here provide Adobe PostScript Level II support, which is standard in the graphics community. Four of the laser printers also provide PCL support.

We also saw three printers that use the host PC for some or all of their image processing—the Epson ink jets and the QMS magicolor WX color laser. The Epson printers use the host's CPU resources to rasterize the image. The QMS unit uses the host to preprocess the image before rasterizing it at the printer. All three printers' own controllers are much simpler—and much less expensive. The QMS was the most affordable color laser in this group, and its performance on our tests was on a par with that of the more expensive units. It will be interesting to see if more printer makers adopt this architecture.

LASER PRINTERS

Digital Equipment Corp.

Colorwriter LSR 2000

Digital Equipment Corp.'s Colorwriter LSR 2000 is a heavyweight contender designed for network service with business users who need to produce colorful reports and presentations, and its color output is good enough for desktop publishers who need near-photo-quality printouts. The LSR 2000 is the most expensive color laser reviewed here (\$10,699 list, \$9,000 street), but it also gives you a lot of horsepower: Canon's 600-dpi, 3-ppm (in color mode) engine, a 100-MHz CPU, 32MB of RAM (expandable to 48MB), a Fiery controller with Adobe PostScript Level 2 from Electronics for Imaging (EFI), a network card, and



Digital Colorwriter LSR 2000

a built-in 514MB hard disk.

Mac users get EFI's sophisticated Pantone color-matching software; the Windows edition is still under development. The internal paper tray holds 350 sheets (100 more than most); a multipurpose tray holds an additional 100 sheets. The LSR 2000 does not handle envelopes or labels. It can be equipped with a second 250-sheet tray and has a 20,000-page-per-month duty cycle—higher than that of the other color lasers we tested.

Setting up the LSR 2000 takes a bit of time but is not a challenge. The developer and four toner cartridges are color-coded, and the manuals are clearly written and easy to follow. We found one design detail of the Canon engine, the silicon oil lubricant reservoir, troublesome: If you move the printer to another location, you have to siphon it out, or you risk spilling oil inside the printer, which

can ruin the imaging drum. This is also true of the IBM and Lexmark units that use the same engine.

Digital's drivers and networking tools are first-rate. Setting up the software is all but automatic for direct connections. The unit's outstanding networking administrative tools allow full remote management and tracking, as well as use auditing and detailed summary reports.

The Canon engine coupled with EFI's Fiery controller produced excellent color laser output. Colors were rich and fully saturated. Gradient fills were smooth, without much banding—even on transparency material. Continuous-tone images were of near-photographic quality, almost as good as magazine photos. The only problem we saw was in registration. Our test target showed noticeable white lines between adjacent blocks of color. This is a known limitation of the Canon engine.

The LSR 2000's speed test results were mixed. Printing a complex transparency took 9 minutes 11 seconds, compared to 18 minutes 49 seconds for the Lexmark Optra C. That's more than twice as fast, but the QMS magicolor completed the same task in 6 minutes 27 seconds. The LSR 2000 took 27 minutes 34 seconds to produce our Photoshop image and came in third to last producing our monochrome and Microsoft documents. This printer may not be a speed demon, but fine output, ease of use, and robust networking keep it in the race.

—James Karney

Colorwriter LSR 2000. List price: \$10,699. Digital Equipment Corp., Marlboro, MA; 800-365-0696, 508-493-2420; fax, 508-467-7512; www.printers.digital.com. *Circle 441 on reader service card.*

Hewlett-Packard Co.

HP Color LaserJet 5M

Hewlett-Packard Co.'s HP Color LaserJet 5M (\$9,195 list, \$7,400 street) is well suited for the general business graphics market. Other laser printers do a better job at producing photos, but for spot-color logos, charts, and clip art in documents, the Color LaserJet is more than adequate, and it is also inexpensive to operate. The 5M version comes with 36MB of RAM, a network

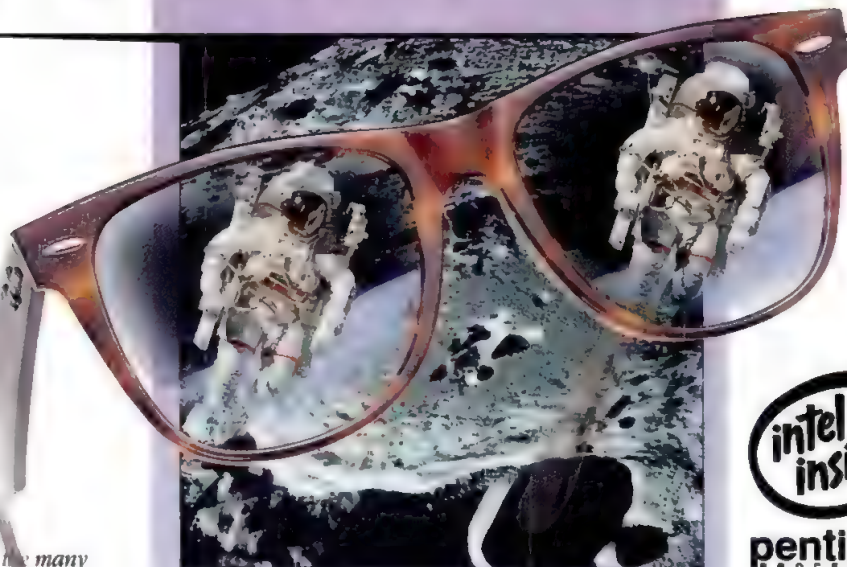
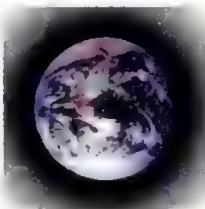
The Vision

THE SKY IS THE LIMIT

A U S T I N B U I L D S C O N F I D E N C E

Global Community: Austin Takes You Around the World

Our commitment to quality and innovation is world-class. Because Austin is a division of IPC Technologies, one call to Austin Computer, taps you into the many benefits of a diversified global organization with interests in notebook PCs, desktop systems, and departmental servers. As your company's computing, communications, or networking needs expand and evolve, you can rely on Austin's global perspective — and 14 years of experience — to deliver an integrated computing solution.



Shades of Fierce Technology

Austin projects eye-catching confidence with a comprehensive product line that includes **high-end notebooks, reliable desktop systems, and bullet-proof departmental servers.** We invite closer scrutiny, because all Austin systems are configured for performance and priced for value. And each machine is backed by superior service and support. **Make contact with Austin.**

Bright Future

We're certain that our personal attention and higher level of craftsmanship will make the difference for your business today. And, as you grow, you can continue to depend on Austin. Our performance is proven in the PC industry — we've won the **5-Star Service Award** from *PC Computing* and the **Industry Information Technology Award** from *Government Computer News*. Call now and put Austin's commitment to work for you. **Seeing is Believing.**



pentium
PROCESSOR

Austin's Family of Products

- **Austin Edge™ Series Notebook Systems:** Includes the PC Magazine Editors' Choice Edge CD with Intel's 430MX™ PCI Set and support for internal CD-ROM, and the multimedia Edge Duet™ with Docking Station.
- **Austin PowerPLUS™ Desktop Systems, and Austin Elan™ Workstations:** Our profile for success features Pentium® technology PowerPLUS desktops and Pentium Pro technology Elan workstations — each with custom configuration options
- **Austin Affinity™ Departmental Servers:** Quad Pentium Pro processors with 12 hot-swap drive bays and enhanced cooling for mission-critical reliability

AUSTIN
COMPUTER SYSTEMS

Driven to Perfection!

**TO ORDER CALL:
800-483-9938**

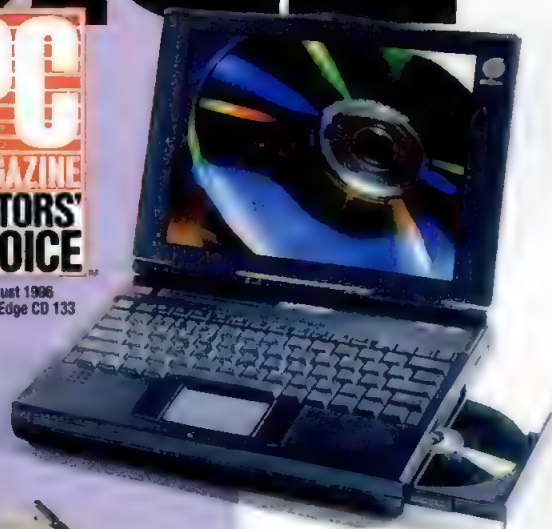
2121 Energy Drive, Austin, Texas 78758
512-339-3500 • FAX 512-454-1357
GSA# GS 3F 4029D
<http://www.austindirect.com>

Government Sales: 800-833-4472
Fortune 1000 Sales: 800-622-5506
Canadian Sales: 800-338-1565
International Sales: 512-339-3547

Ad Code:
9938



August 1986
Austin Edge CD 133



Business Lease \$150 / month

Actor **James Doohan**
as seen in Austin ads
on CNN.



only near Party C father's territory

Business Lease: \$132 / month

Austin Power Desktops

FUTURE FORCE



Austin Élan Workstation 200

200 MHz Intel Pentium Pro Processor with integrated 256K Pipeline Burst Cache
Intel 440FX PCI Set
Intel V840FX Motherboard
16MB EDO RAM (expandable to 256MB)
3GB Enhanced IDE Hard Drive
128-Bit PCI Video Accelerator – 2MB MRAM
8X IDE CD-ROM Drive, 16-Bit Audio, 40W Stereo Speakers
3.5" 1.44MB Diskette Drive
Mid-Tower ATX Chassis
15" .28mm NI SVGA Monitor
104-Key Keyboard & Mouse
Energy-Star Compliant
Windows '95 Pre-Installed
Three-Year Parts & Labor Warranty,
One-Year On-Site Service
Business Lease: **\$80 / month**

\$2,139

Call to upgrade to Windows NT
Workstation – **add \$275**

See the Austin Difference

Call Austin and experience our stellar attention to detail and phenomenally fast response. Expect **Reliable Systems, Custom Configuration, and Quick-Ship** promptness without extra charges. Whether you're outfitting the workforce with the value-priced **PowerPLUS desktops** or the high-end **Élan Workstations**, you'll find we **stand behind every system we ship.**

A Vision of Your Success

Each **Austin Élan Workstation** gives you a selection of innovative features, like the **200 MHz Pentium Pro processor** and **128-bit PCI acceleration** with **2MB of MRAM**, as well as an **8X CD-ROM** and **16-bit Audio**. Windows 95 is preinstalled (or upgrade to Windows NT), and hard-drive capacity choices range up to 4GB.

With impressive features like these, the **Austin Élan is clearly the stand-out price performer in today's PC workstation market.**

Austin PowerPLUS 133

133 MHz Intel Pentium Processor (also available in 100-, 120-, 150-, 166-, or 200 MHz configurations)
Intel 430HX PCI Set
Intel TC430HX Motherboard
16MB EDO RAM (expandable to 128MB)
256KB L2 Pipeline Burst Cache
1.2GB Enhanced IDE Hard Drive
64-Bit PCI Video Accelerator – 2MB DRAM
8X IDE CD-ROM Drive, 16-Bit Audio, 40W Stereo Speakers
28.8 Fax/Modem
15" .28mm NI SVGA Monitor
104-Key Keyboard & Mouse
Energy-Star Compliant
Windows '95 Pre-Installed
Three-Year Parts & Labor Warranty,
One-Year On-Site Service
Business Lease: **\$66 / month**

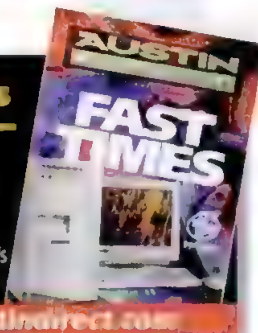
\$1,769

Call to Upgrade to PowerPLUS 150 –
add \$100

**Call for Austin's
latest catalog –
your best
one-stop direct
PC resource!**

You'll find more about Austin's
Affinity Pentium Pro Servers.

<http://www.austindirect.com>



AUSTIN
COMPUTER SYSTEMS
Driven to Perfection!

**TO ORDER CALL:
800-483-9938**

2121 Energy Drive, Austin, Texas 78758
512-339-3500 • FAX 512-454-1357
GSA# GS 3F 4029D
<http://www.austindirect.com>

Government Sales: 800-833-4472
Fortune 1000 Sales: 800-622-5506
Canadian Sales: 800-338-1565
International Sales: 512-339-3547



Guide to Color Output

On these pages we present two output samples from each of the printers tested—a Photoshop photographic image and a business graphic created in Microsoft PowerPoint. To help you judge quality, we've included a sample from the Iris SmartJet 4012, a \$25,000 professional-level proofer that is one of the best proofing tools for serious prepress graphics work. When you compare samples to this output, discount minor shifts in color, since color can vary depending on printer settings.

Of desktop printers, those using thermal dye transfer offer the highest-quality output, and all of the ones we tested did a commendable job. At the top of the heap is Seiko's ColorPoint 835 PS. Amazingly, this printer outdid the Iris in some ways. The full business-graphic slide we created includes a circular gradient fill, and the Iris printout shows faint concentric rings instead of a continuous gradient. The Seiko printout does not. Similarly, in the photo, the Seiko produced the yellow-to-orange background more gradually than the Iris. It didn't retain the same detail and tonal quality in the faces, but it came close, which made it clearly the best in the batch.

The Tektronix Phaser 480X comes in a close second. But there is a thin slice of white along the edge of one pie wedge, indicating a slight misregistration. As with most of the thermal dye printers, the Phaser 480X loses tonal variation in the light areas on the faces, which detracts from the illusion of three-dimensionality. In looking at the photo samples, note too the soft focus from the Tektronix Phaser 440, the overly sharp edges from the Mitsubishi printers, and the slightly washed-out look in the output from both Fargo printers.

Among the color lasers, the Tektronix Phaser 550 did the best job. The rest suffered from troublesome problems. The IBM, Digital, and Lexmark printers, for example, all left annoying white lines along the edges of one or more pie slices—a known problem that

their Canon engines have with registration. In the photos, the Xerox and QMS printers show dithering and, in some cases, posterization. The Lexmark, Digital, and IBM printers did a much better job, but all lost some tonal variation, some details in shadow, or both—areas in which the Phaser 550 did an excellent job. The solid-ink Phaser 350, with a lower resolution than the laser printers, showed more dithering. But you may prefer its output to all but the Phaser 550's, since it doesn't suffer from more serious problems.

Not surprisingly, ink jet printers offered the lowest-quality output. For the graphic, most had problems with the gradient. Some had other problems as well, including obvious dithering and banding in the form of vertical lines from printhead passes. The Epson printers offered the best output, thanks to 720-dpi resolution on special-purpose paper. As the output demonstrates, ink jets still can't produce true photographic quality—though both Epsoms come close. Thanks to sophisticated dithering schemes, dithering on the Epson ink jets translates to a graininess rather than obvious dithering patterns.

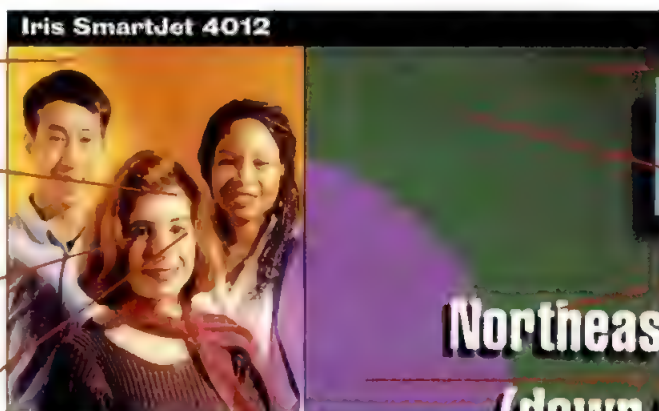
The output for the thermal wax Phaser 240, finally, helps demonstrate why that technology is fading away. Dithering produces clear patterns in the graphic and graininess in the photo. And note the places where the printer didn't lay down the wax properly, leaving, for example, red speckles in the hair of the woman in the center.

Orange and yellow should gradually flow into each other, without sharp changes in color or multiple steps.

A shadow on a forehead should shade from light to dark, without any sharp demarcation.

A photo should retain all of the detail in the shadowed areas.

Look for tonal variation in bright areas. A loss of variation flattens the picture.



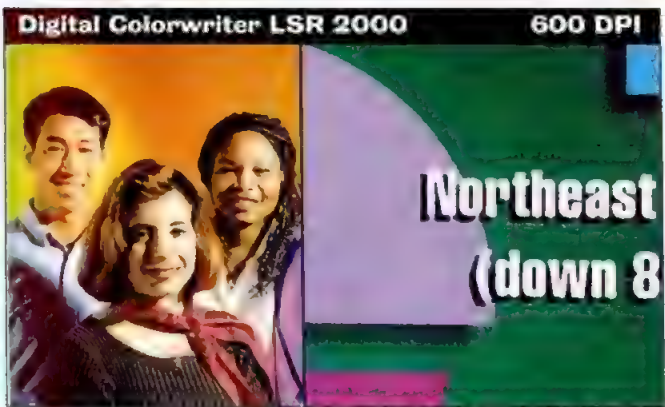
The background should be solid, without any dithering patterns or banding.

Colors should be smooth, without visible dithering patterns or graininess.

Edges of text should be crisp, without any hint of raggedness.

Pie slices, being solid fills, should have sharp edges, without any white between colors or darkened lines along the edges.

L A S E R S



MANY SCIENTISTS
BELIEVE THAT
IT WILL BE POSSIBLE TO DEVELOP
TELEPATHIC
POWERS
AS A PRACTICAL TOOL OF
COMMUNICATION.



pentium

For information on your next PC upgrade, call 1-800-Hi-Chip (448-2244). Website address: www.Hi-Chip.com

IN THE MEANTIME, WE OFFER THIS ALTERNATIVE.

To communicate well is a virtue. It's also what you've got to do to make things happen. Whether you do this through sweet reason or imperial dictate, you must transmit thoughts, often over vast distances. The precise point of Mobilized Computing™ and the new Hitachi Notebooks. Powerful instruments for effective persuasion. Since tweaking computers isn't your priority, they come ready to connect by 28.8 modem to the Net, online services, two-way fax, or local area networks via that rarest of luxuries, a built-in LAN port. Your ideas, boldly advanced, can move the world. But, you must get them to your audience.

After all, they aren't mind readers.



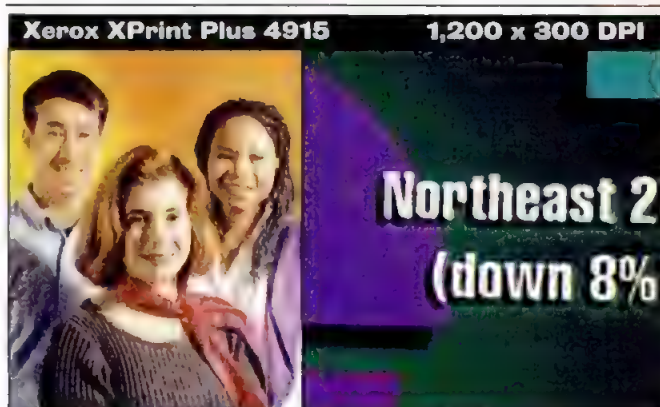
Remote Control

Series C Notebook is available with 12.1" active matrix screen, Pentium® 120 MHz chip.
Series M Notebook is available with 11.6" active matrix screen and Pentium® 133 MHz chip.

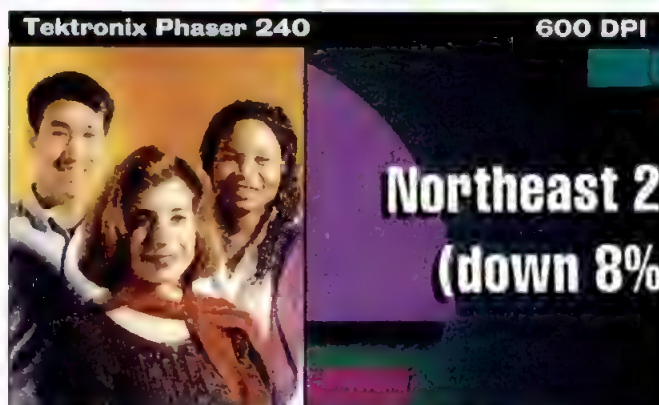
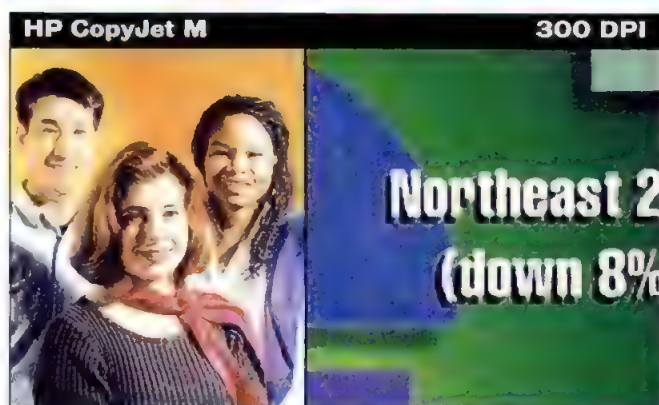
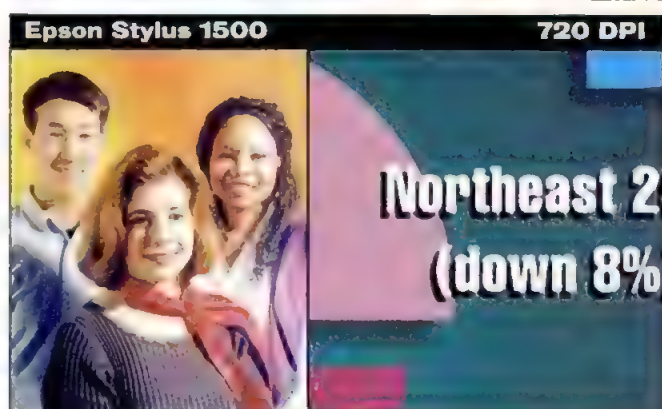
© 1998 Hitachi Data Systems Inc. All rights reserved. Mobilized Computing™ and Remote Control™ are trademarks of Hitachi Data Systems Inc. (HDS) which may be registered in some jurisdictions. The Hitachi logo and Pentium® are registered trademarks of Intel Corporation. All other marks are owned by their respective companies.

CIRCLE 082 ON READER SERVICE CARD

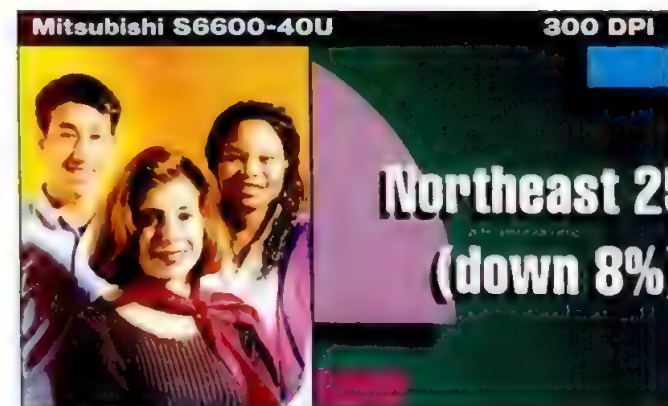
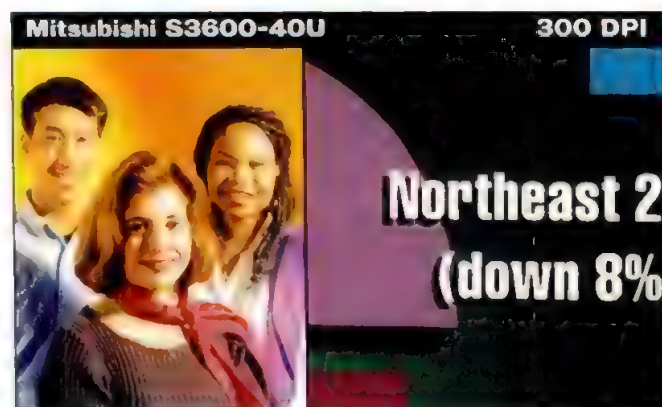
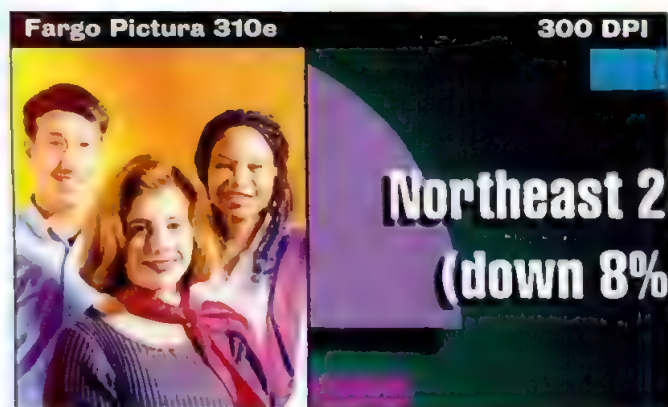
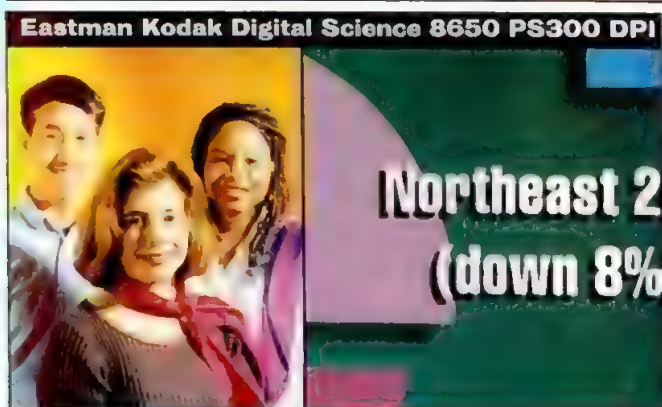
L A S E R S



I N K J E T / T H E R M A L W A X



THERMAL DYE



ANY COPY COLOR CAPABLE
Vivid color on any office
paper or transparency.

IN A CHECK PAGE A tiny
fraction of what you pay
for color photocopies.

PRINT BLACK AND WHITE Now you
can send everything to
your color printer. Black
text pages cost even less
than on a b&w laser.

LEADER From the leader in
laser-class color printers
with 14 years in color printing,
50 years of innovation.

40 PPM COLOR Twice as fast
as any competitor's desktop
laser. Far beyond any inkjet.

Brilliant performance.

The new Phaser® 350 costs less to own, less to use than any other laser-class, workgroup color printer. With all the award-winning performance that's become the hallmark of Tektronix: RISC processing. Ample RAM. PostScript® Level 2. Networkability. So now our incredible



 **BANCOR** International



Phaser 140



Phaser 240



Phaser 440



Phaser 350



Phaser 550



Phaser 480X



Phaser 300X

Breakthrough price.

speed and brilliant color are the most affordable and economical, too. All barriers are down. Waiting for color is history. No wonder, at over \$500 million in color printing revenue, Tektronix sells more workgroup color printers than anyone.

Tektronix

Call 800/835-6100, Ext. 1308. <http://www.tek.com/CPad?1308>

CIRCLE 001 ON READER SERVICE CARD

HARDWARE

Color Printers



HP Color LaserJet 5M

card, and Adobe Level 2 PostScript support; there is also a Version 5, available (without PostScript and with only 20MB of RAM) for \$6,000 (street).

Hewlett-Packard has done an excellent job on the networking side; the drivers are robust and make the unit easy to share and control via the bundled Jet-Direct software. When it comes to output, however, the printer's results are mixed. The quality is very good for a 300-dpi machine, but all the other lasers in this roundup offer true 600-dpi at least. Hewlett-Packard's new Image Resolution Enhancement Technology 1200 (HP Image RET 1200) is supposed to offer the equivalent of 1,200-dpi quality for graphics, from the 300-dpi Konica laser engine, but this claim is overstated: The output doesn't feel like 1,200 dpi. The Color LaserJet had difficulty with gradient fills and continuous-tone images that higher-resolution printers can overcome. It produced noticeable banding and could not reproduce finer details in either shadowed or highlighted areas. On the plus side, solid colors are vibrant, clean, and clear. The Color LaserJet showed no problems with registration or with covering large areas with single shades.

The Color LaserJet is no slouch when it comes to performance, even though HP rates the unit at only 10 pages per minute (ppm) for monochrome and 2 to 3 ppm for color prints. It was consistently near the top of the list for most tests, and it often came in first.

Pay close attention when setting up this printer, following the clearly outlined steps in the manual. In addition to taking off the usual "remove before use" shipping devices, you'll have to clean the laser optics and the fuser wire, mount two developer cartridges, and load the contents of four toner bottles into their reservoirs.

Using toner bottles instead of cartridges greatly reduces the cost per page. The Color LaserJet produces 15 percent-coverage color output at about 7 cents a page, compared to 17 cents a sheet for color lasers with separate cartridges. Monochrome output averages about 2 cents a sheet for the HP—half as much as for others.

While the Color LaserJet lacks the resolution that you need for demanding graphics applications, it hits the mark for users who want color output for reports and presentations. Its speedy performance, its low operating cost, and its easy networking will keep this model a favorite.—JK

HP Color LaserJet 5M. List price: \$9,195. Hewlett-Packard Co., Santa Clara, CA; 800-752-0900; fax, 415-857-5518; www.hp.com. Circle 444 on reader service card.

IBM Printing Systems Co.

IBM Network Color Printer

The IBM Network Color Printer will satisfy the needs of both business users who need simple color output for reports and presentations and desktop publishers who want nearly photographic-quality output. It is one of two printers in this roundup that are built around a Canon laser engine and a Fiery controller by EFI (the other is from Digital), though a quick look at the performance of these two 600-dpi printers shows obvious differences between them. The IBM proved faster on every test, and it's about \$1,500 less expensive (\$8,999 list, \$7,500 street). Potential buyers should note that the IBM is a notch below the \$7,000 Tektronix Phaser 550 with the latter's KME engine, which of-

fers faster performance still and more consistently pleasing output. Still, the IBM is very recommendable.

The IBM printer is less expensive than its Digital cousin primarily because it's designed to work with at least 16MB of RAM rather than 32MB. The printer uses a compression algorithm to squeeze images into the smaller memory space. For images that can't fit into 16MB with lossless compression, the printer switches to a lossy compression scheme.

Setup is easy, thanks to the Canon engine's prefilled toner cartridges. In addition to the four toner cartridges, however, you still have to install the photoconductor drum cartridge, fuser oil bottle, and used-toner bottle. As with the Digital and Lexmark units, if you move the unit to another location after installing the oil, you'll want to siphon it to avoid a spill.

The printer comes with utilities for quickly downloading print jobs over a network and for easily monitoring job and printer status. Ethernet support with TCP/IP, IPX/SPX, and NetWare is standard. A Token-Ring option should be available in early 1997.

The 600-dpi Canon engine and EFI Fiery controller produce smaller dithering cells than a bilevel 600-dpi printer and thus obtain greater effective resolution. The resulting photos can pass for photographic quality at arm's length, though they prove somewhat grainy closer up. For graphics, the printer offers fully saturated colors, solid thin lines, and smooth gradients. As with the Digital printer, the Canon engine often leaves thin white lines at the edges of solidly filled areas. IBM says it is working on this registration problem.

On our performance tests, the IBM printer outdid its Digital cousin on every count. It was generally in the middle of the pack or a little behind, though all its times were reasonable. The IBM Network Color Printer is not the best color laser currently on the market, but it is certainly a creditable device that merits your attention.—MDS

IBM Network Color Printer. List price: \$8,999. IBM Printing Systems Co., Boulder, CO; 800-426-3333, 404-238-1234; fax, 303-924-5402; www.can.ibm.com/ibmprinters. Circle 445 on reader service card.



IBM Network Color Printer

LOOKING FOR THE BEST PCs ON THE MARKET?



MICRONTM
ELECTRONICS, INC.

WHAT A COINCIDENCE, WE

To get an idea of how Micron Electronics™ products have achieved leadership status in reliability, you really have to look inside. Micron focuses on superior engineering, from picking

FAST 8X CD-ROM

**200 MHz PENTIUM®
PROCESSOR**

**32MB ULTRA-FAST EDO RAM
UPGRADEABLE TO 128MB**

**HIGH SPEED 512KB
PIPELINE BURST CACHE**

**EIDE OR FAST SCSI-2
HARD DRIVE**

**FULL-LENGTH SLOTS
ACCESSIBLE**

MASSIVE EXPANSION BAYS

**4MB EDO HIGH RESOLUTION
3D VIDEO ADAPTER W/MPEG**

**MOST ADVANCED
INTEL 82430HX CHIPSET**



**16-BIT STEREO
SOUND AND SPEAKERS**

**TOOL-FREE CHASSIS
W/SECURITY FEATURES**

**M
M**

HAPPEN TO MAKE THEM.

the best components available to rigorous performance and reliability tests. The result is outstanding performance you can count on. Our first-tier reliability status proves it.

RELIABILITY RANKING

1ST TIER



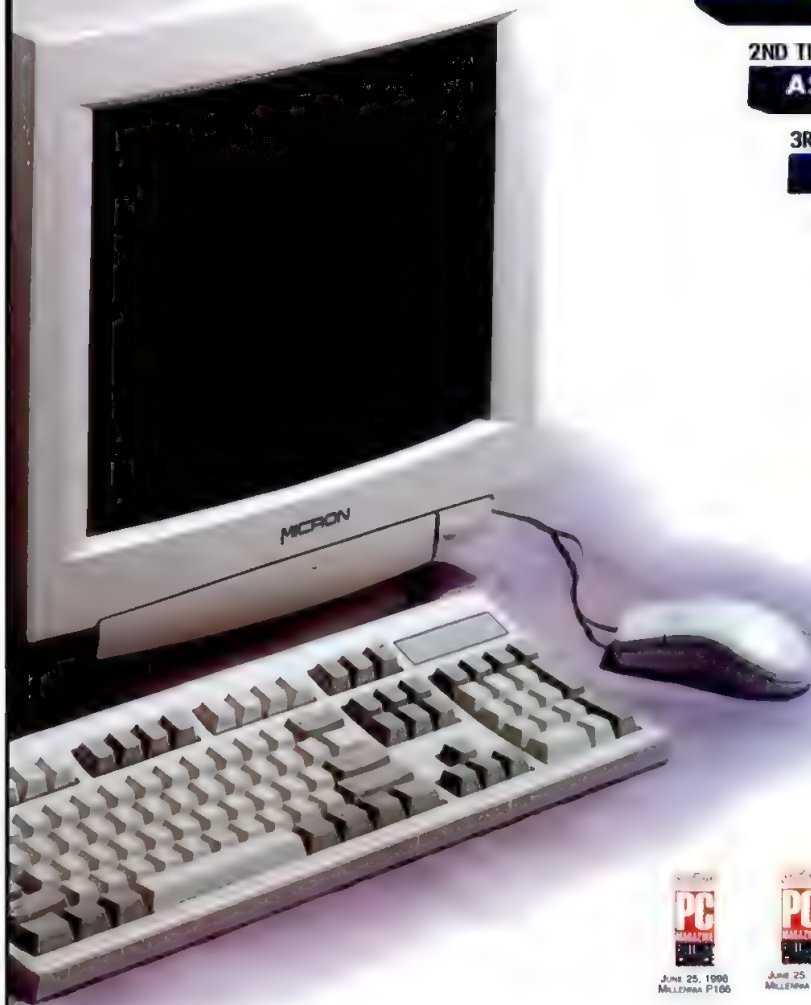
2ND TIER



3RD TIER



Source: PC World Reliability & Service Monitor, May 20 - November 20, 1995



Warranty & Support

- 5 year limited warranty on microprocessor and main memory
- 3 year limited partitions system warranty
- 1, 2, or 3 year optional on-site service agreement for Micron desktop systems
- 30 days of free Micron-supplied software support for Micron desktop systems
- 30-day money back policy
- 24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained from Micron's website or by request.



JUNE 25, 1990
MILLENNIA P166



JUNE 25, 1990
MILLENNIA P133



AUGUST 1, 1990
MILLENNIA
TRANSPORT P133



JUNE 1996
MILLENNIA P166



READERS' CHOICE FOR CUSTOMER
SERVICE AND RELIABILITY
1994 AND 1995



Designed for
Microsoft
Windows 95

EDITORS' CHOICE AWARDS
MILLENNIA™ P166 & P133

**WINDOWS® 95 &
OFFICE INSTALLED**

MICRON™
ELECTRONICS, INC.

800-486-2065
<http://www.mei.micron.com>

MILLENNIA™ P166

- Intel 166MHz Pentium® processor
- 512KB pipeline burst cache, flash BIOS
- 8X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- 5-year/3-year Micron Power™ warranty

- 16MB EDO RAM • 1.2GB EIDE hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Works 95 CD

\$1,999 Business lease \$68/month

- 32MB EDO RAM • 2.1GB EIDE hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Office Pro 95 & Bookshelf® 95 CDs

\$2,399 Business lease \$82/month

- 64MB EDO RAM • 3.1GB EIDE hard drive
- 17" Micron 17FGx, .26dp (15.8" display)
- Microsoft Office Pro 95 & Bookshelf® 95 CDs

\$3,149 Business lease \$107/month

- With 133MHz Pentium processor.....subtract \$200
- With 200MHz Pentium processor.....add \$100

MILLENNIA™ P200 PLUS

- Intel 200MHz Pentium processor
- 512KB pipeline burst cache, flash BIOS
- PCI 32-bit Ultra SCSI Fast-20 controller
- 8X SCSI CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 & MS Plus! CD
- 5-year/3-year Micron Power warranty

- 16MB EDO RAM • 2GB Fast SCSI-2 hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Works 95 CD

\$2,899 Business lease \$99/month

- 32MB EDO RAM • 2GB Fast SCSI-2 hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Office Pro 95 & Bookshelf® 95 CDs

\$3,199 Business lease \$109/month

- 64MB EDO RAM • 4GB Fast SCSI-2 hard drive
- 17" Micron 17FGx, .26dp (15.8" display)
- Microsoft Office Pro 95 & Bookshelf® 95 CDs

\$4,249 Business lease \$145/month

- With 166MHz Pentium processor.....subtract \$100

HOME MPC™ P133

- Intel 133MHz Pentium® processor
- 256KB pipeline burst cache, flash BIOS
- 16MB EDO RAM • 1.2GB EIDE hard drive
- 8X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- 28.8 fax/modem, speakerphone, voice mail
- Microsoft® Phone telephony software
- Internet ready: Internet in a Box from CompuServe®/Spry Microsoft Internet Explorer
- Prodigy®, America Online® & CompuServe trial memberships
- PCI 64-bit 3D video, MPEG, 2MB EDO
- 15" Micron 15FGx, .28dp (13.7" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- Quicken® Financial Pak includes: Quicken Deluxe 5.0; Quicken Financial Planner; Quicken Parents' Guide to Money; Quicken Family Lawyer
- Family Pak includes: ABC by Dr. Seuss; Thinkin' Things Collection I; Earthworm Jim; and Mechwarrior® II
- Microsoft Home Pak includes: Works 4.0 for Windows 95; Publisher Deluxe for Windows 95; Encarta® 96; Encarta 96 World Atlas; Music Central® 96; Wine Guide; Arcade 1.0; Scenes—Sports Extremes Collection; Cinemania® 96; Julia Child Home Cooking: Best of Windows Entertainment Pack; CD Sampler (including Fury® game demo)
- 5-year/3-year Micron Power™ warranty

\$1,999 With 166MHz Pentium processor.....add \$200

HOME MPC™ P200

- Intel 200MHz Pentium processor
- 256KB pipeline burst cache, flash BIOS
- 32MB EDO RAM • 2.1GB EIDE hard drive
- 8X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit 3D WaveTable stereo sound card
- Advent AV270 2x25 watt stereo speakers
- 28.8 fax/modem, speakerphone, voice mail
- Microsoft Phone telephony software
- Internet ready: Internet in a Box from CompuServe®/Spry Microsoft Internet Explorer
- Prodigy, America Online & CompuServe trial memberships
- PCI 64-bit 3D video, MPEG, 2MB EDO
- 15" Micron 15FGx, .28dp (13.7" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 & MS Plus! CD
- Microsoft Office Pro 95 & Bookshelf® 95 CDs
- Quicken Financial Pak includes: Quicken Deluxe 5.0; Quicken Financial Planner; Quicken Parents' Guide to Money; Quicken Family Lawyer
- Family Pak includes: ABC by Dr. Seuss; Thinkin' Things Collection I; Earthworm Jim; and Mechwarrior 2
- Microsoft Home Pak includes: Works 4.0 for Windows 95; Publisher Deluxe for Windows 95; Encarta 96; Encarta 96 World Atlas; Music Central 96; Wine Guide; Arcade 1.0; Scenes—Sports Extremes Collection; Cinemania 96; Julia Child Home Cooking: Best of Windows Entertainment Pack; CD Sampler (including Fury game demo)
- 5-year/3-year Micron Power warranty

\$2,899 With 166MHz Pentium processor.....subtract \$100
With 17" Micron 17FGx, .26dp (15.8" display).....add \$250

MILLENNIA™ TRANSPORT

- Mobile Intel Pentium processor
- Intel 430MX PCI chipset
- 256KB L2 pipeline burst cache
- 16MB EDO memory (48MB max.)
- 8X modular CD-ROM drive
- PCI graphics accelerator, 1MB EDO memory
- Pick-a-Point™ dual pointing devices integrate both pointing stick and touchpad
- Removable EIDE hard drive
- 3.5" modular floppy drive
- Intelligent modular lithium-ion battery
- 16-bit stereo sound
- Built-in stereo speakers and microphone
- 2 Type II or one Type III PCMCIA slots
- S-video and NTSC-video outputs
- Headphone, microphone and line-in jacks
- 2 infrared ports, one front, one back
- Parallel, serial, VGA and 2 PS/2 ports
- Dimensions: 11.7" x 9.4" x 2.0", Weight: 6.9 lbs.
- Nylon carrying case
- Microsoft® Windows® 95 and MS® Plus! CD
- Microsoft Office Pro 95 and Bookshelf® 95 CDs
- Kensington® security lock ready
- 5-year/3-year Micron Power™ limited warranty

† 6.9 lbs. includes 3.5" floppy and one battery
† Lock secures both Millennium Transport and MicronDock™

OPTIONS

- With 150MHz Pentium processor.....add \$200
- With Motorola Montana 28.8 fax/modem.....add \$259
- With 3Com® Ethernet 10BT PCMCIA.....add \$149
- With Samsonite® leather carrying case.....add \$99
- With 2nd modular lithium-ion battery.....add \$199
- With 2nd 1.2GB hard drive.....add \$599
- With 2nd 2.1GB hard drive.....add \$699
- With 16MB DIMM module upgrade.....add \$349
- With 32MB DIMM module upgrade.....add \$749
- MicronDock™ multimedia port replicator.....add \$299
- ExecPac™ desktop package.....add \$799

- 133MHz Intel Mobile Pentium processor
- 16MB EDO memory (48MB max.)
- 12.1" active matrix display, 800 x 600
- 1.2GB removable hard drive

\$4,399 Business lease \$150/month

- 133MHz Intel Mobile Pentium processor
- 32MB EDO memory (48MB max.)
- Motorola® Montana 28.8 fax/modem
- 12.1" active matrix color display, 800 x 600
- 1.2GB removable hard drive
- 2nd lithium-ion battery

\$5,199 Business lease \$163/month

- 150MHz Intel Mobile Pentium processor
- 32MB EDO memory (48MB max.)
- 12.1" active matrix color display, 800 x 600
- 2.1GB removable hard drive
- Motorola® Montana 28.8 fax/modem
- 2nd lithium-ion battery
- Samsonite® leather carrying case

\$5,550 Business lease \$174/month



MILLENNIA™ PRO200

- Intel 200MHz Pentium® Pro processor
- 256KB internal cache, flash BIOS
- 8X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows NT® Workstation CD
- 5-year/3-year Micron Power™ warranty

\$2,249 Business lease \$77/month

- 16MB EDO RAM • 1.2GB EIDE hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Works 95 CD

\$2,899 Business lease \$99/month



MILLENNIA™ PRO200 PLUS

- Intel 200MHz Pentium Pro processor
- 256KB internal cache, flash BIOS
- PCI 32-bit Ultra SCSI Fast-20 controller
- 8X SCSI CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO
- Tool-free mini-tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT Workstation CD
- Microsoft Office Pro 95 & Bookshelf® 95 CDs
- 5-year/3-year Micron Power warranty

\$3,349 Business lease \$114/month

- 64MB EDO RAM • 4GB Fast SCSI-2 hard drive
- 17" Micron 17FGx, .26dp (15.8" display)

\$4,399 Business lease \$150/month

\$7,499 Business lease \$236/month

MICRON™
ELECTRONICS, INC.

800-486-2065
<http://www.mei.micron.com>

930 E. Karlov Road, Tampa, FL 33607 • Mon-Fri 9am-10pm Sat 7am-5pm (MT) • International Sales Hours: Mon-Fri 9am-7pm (MT) • 208-893-3434 • Fax 208-893-3424

• Purchase Order Fax 208-893-8992 • Technical Support Available 24 Hours / 7 Days • Technical Support E-mail: techsupport@mei.micron.com

International Sales 208-893-8970 • International Fax 208-893-7393 • Tollfree from Puerto Rico 800-708-1756 • Tollfree from Mexico 95-800-708-1755 • Tollfree from Canada 800-708-1758

©1996 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions and/or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice. Prices do not include shipping and handling. 30-day money-back policy does not include return freight and original shipping/handling charges, applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Lease prices based on 36-month lease. Intel, Intel Inside and Pentium are registered trademarks of the Intel Corporation. Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation. All other service marks, trademarks and registered trademarks are the property of their respective companies. PCMG-SOHO-96108

Lexmark International Inc.

Lexmark Optra C

The Lexmark Optra C (\$6,849 list, \$6,400 street, without network card) is designed for workgroups needing high-resolution color output and robust network connectivity. The printer's output quality is excellent for business graphics, and the 600-dpi Canon engine can deliver nearly photo-quality images for desktop publishers. Just don't expect speed, for its designers traded performance for a lower cost.

The basic configuration comes with



Lexmark Optra C

8MB of RAM and a 25-MHz AMD processor. These features yield slower performance than either the Digital or the IBM units, which are based on the same engine but deliver a more powerful processor and controller combination. The \$7,999 (\$7,300 street) Optra C Pro version sports 32MB of RAM and a 25-MHz processor, and it has a network card already installed.

Lexmark's MarkVision network administration utility is excellent, allowing complete control of the unit. Both a graphical map and dialog boxes report on printer status and error conditions. Network managers can use it to monitor use, control access, and obtain detailed reports for accounting purposes.

Installing the Optra C is virtually foolproof. The printer comes with a full set of consumables and a photoconductor drum, and the quick-start guide is clear and informative. As with the Digital and IBM units, when moving the printer, you have to take care that the silicon oil in the reservoir does not spill.

The quality of the Optra C's output was very good. Colors were well saturated, and gradient fills were smooth, with

no banding. Lines and solids printed without breaks. Photographic images showed good tonal range, and contrast was consistent with 600-dpi output. As with the other Canon-based printers, some output samples showed registration problems, with thin white lines showing between two adjacent colors.

Throughput was slow compared with the other lasers here. On our monochrome Microsoft Word and Microsoft Excel tests and our color Freelance Graphics Presentation test, the speed delta was acceptable. On more complex jobs, however, the Optra C slowed considerably. It took 18 minutes 38 seconds to complete our Microsoft Publisher Color Newsletter test (compared with about 2 minutes for the Digital and IBM printers), and almost an hour to print our Photo-shop Photo test image—twice as long as the Digital and IBM units.

The Lexmark Optra C has a good list of features, a low purchase price, and outstanding drivers. If you feel the need for speed, this is not the printer for you. If you want a top-quality four-color network laser at a bargain price, maybe this is a bargain that's worth the wait.—JK

Lexmark Optra C. List price: \$6,849. Lexmark International Inc., Lexington, KY; 800-891-0331, 606-232-2000; fax, 606-232-2380; www.lexmark.com. Circle 447 on reader service card.

QMS Inc.

QMS magicolor CX/40, QMS magicolor WX

These color lasers from QMS are aimed at the general business user who needs color for charts and documents. They fill that role adequately; users who need deadly accurate color output will want to look elsewhere.

We reviewed the QMS magicolor CX/40 (\$8,499 list, \$7,650 street), a Postscript-based unit that comes with 40MB of RAM and delivers 1,200-by-600 resolution. (A CX/32, with only 32MB of RAM and a top resolution of 600-by-600, is available for a list price of \$7,999). The 600-dpi QMS magicolor WX is a host-based color laser that uses the host PC's resources for most of the image processing, which keeps the list price down to \$3,999 (\$3,600 street)—the least expensive color laser

printer on the market. Both printers come with built-in network interface cards standard and produced acceptable color output with respectable speed.

As with the Xerox lasers reviewed here, the QMS printers use the 600-dpi laser engine from Hitachi; aside from that, the QMS units differ quite a bit from Xerox units. For one thing, the QMS prices include a visit by a technician to set up the printer. If you decide to go it on your own, it's not difficult at all; in fact, QMS provides better setup instructions than Xerox does. The front-panel indicators on the QMS units aren't as good as those on the Xerox units. In fact, we didn't realize that someone had removed the cyan cartridge from one of the printers until we noticed that the output looked strange; the printer did not indicate that the cartridge was missing.

The colors from the Hitachi engine don't look quite as bright or true as those from a Canon engine; the matte toner and a slight overemphasis on black in the printers' stochastic screening tend to subdue the colors. However, we were generally happy with the output.

The CX/40's color registration was especially good (unlike that of the Canon-based units) and its text and colored lines crisp, and it produced near-continuous-tone graphics with no banding. This was achieved at a fairly respectable speed; the CX/40 stuck to the middle of the pack, albeit with a boost provided by the extra memory.

The WX's performance was similarly steady, though because it uses a combination of host-based and printer-based processing, its performance may vary depending on your CPU (we tested on a 90-MHz Pentium with 16MB of RAM). Its dithering algorithms also tended to produce more washed-out prints than ei-



QMS magicolor CX/40

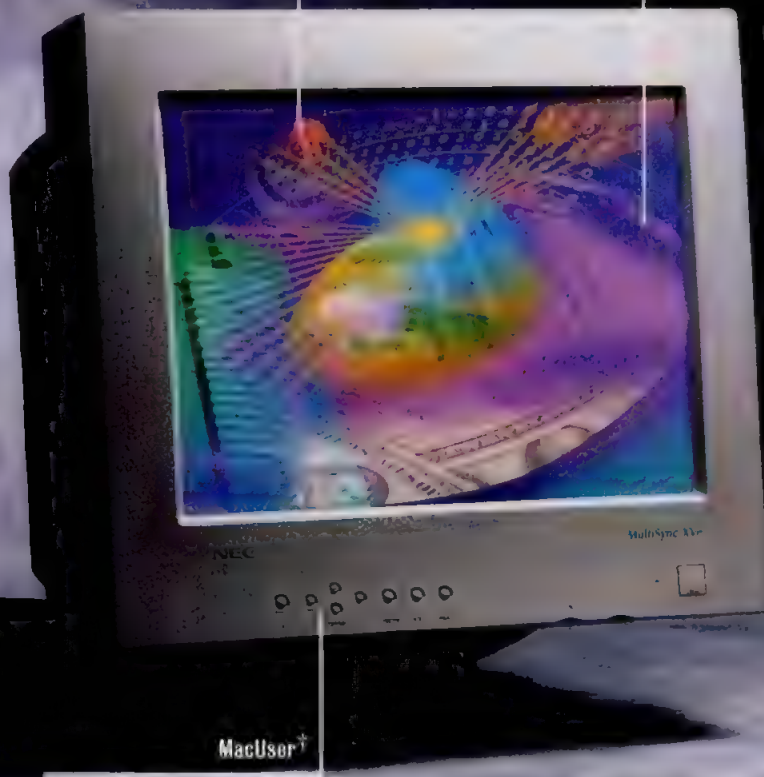
CRITICS CALLED IT "VIRTUALLY FLAWLESS."

"...bright screen, superior on-screen controls and low price."

Windows*

"...great picture quality, advanced features, and top-notch support... a superb monitor."

FamilyPC**



MacUser*

"A tremendous bargain, with great, easy-to-use controls."

Introducing the MultiSync® XV+™ Series Monitors. Upgraded, refined, and with new features that give you more control over your screen and practically all monitor functions.

Both the MultiSync XV15+™ and the MultiSync XV17+™ deliver the sharp detail, bright colors and crystal clear images

you've come to expect. Only now, you'll notice enhanced contrast and even less glare, thanks to our unique OptiClear™ screen surface.

Because front-mounted digital controls were so popular on the MultiSync XV17,™ we've added them to the MultiSync XV15+. So now both XV+ monitors allow for quick and easy image adjustments.

Designed for

Microsoft
Windows 95

*Copyright ©1995 by CMP Publications, Inc. Reprinted from Windows Magazine with permission. **Quote reprinted with permission, FamilyPC Magazine, (June '95)
OptiClear and See, Hear and Feel the Difference are trademarks of NEC Technologies, Inc. Windows and the Windows 95 logo are registered trademarks of Microsoft

THAT SCATHING REVIEW LED US TO THESE IMPROVEMENTS.

OptiClear Screen Surface
Enhances contrast while also
eliminating glare.

Plug and Play Compatibility
for Windows 95

Lets you simplify
installation.



Front-mounted digital controls
on the MultiSync XV15+

Now both the XV15+ and XV17+ allow
for quick and easy image adjustments.

In addition to PC and Macintosh® compatibility, the MultiSync XV+ Series features Plug and Play compatibility for Windows® 95. So you'll enjoy optimized display performance as well as simplified installation.

The MultiSync XV+ Series also delivers the quality and reliability you expect from NEC, and is backed by a 3-year limited warranty.

The new MultiSync XV+ Series from NEC. Once "virtually" flawless, now just plain flawless. To learn more about the XV+ Series, call 1-800-NEC-INFO. For information via fax, call 1-800-366-0476 and request catalog #1. Or feel free to contact us on the Internet at <http://www.nec.com>. **SEE, HEAR AND FEEL THE DIFFERENCE.™**

NEC

BENCHMARK TESTS

Color Printers



Color lasers generally led the field on our print-speed tests, though the HP DeskJet 1600CM, an ink jet, was a near match. The thermal dye transfer printers, predictably, were much slower in producing their photograph-quality output.

Engine speed is the most important indicator of overall performance, though for some specific tasks, a faster processor speed, more memory, a better designed driver, or even a different printer language or different PostScript version can make up for a slower engine speed. And while speed is an important issue, with this class of printer output quality is equally important. When considering differences in test scores, keep in mind that some printers took more time on our tests because they offer higher resolution output. (See the sidebar "Guide to Color Output" to view actual output samples side by side.)

What the Numbers Mean

Mixing Black Text and Color Our Microsoft Excel Color Charts and Microsoft Publisher Color Newsletter tests measure how quickly these printers can produce documents that mix color graphics and images with black text, for such projects as reports, presentations, and newsletters. For the color Excel document we used each printer's standard resolution, while we used the printer's highest resolution for the Publisher newsletter. We did not run these tests on the thermal wax transfer or thermal dye transfer printers or on the Epson Stylus Pro XL ink jet, as these units are intended only for color graphics only, not for business documents.

The color laser printers showed a strong correlation between engine speed, resolution, and performance. On the Excel color output, the Tektronix Phaser 350 (a solid-ink printer designed to compete with lasers) outpaced the pack because of a combination of its 6-ppm (in color) engine and lower, 300-dpi resolution (the other printers were producing 600- or 1,200-dpi output). The 2-ppm Tektronix Phaser 550, the 3-ppm HP LaserJet 5M, and the 3-ppm QMS and Xerox pairs were bunched in the second tier on our performance tests. Note that the LaserJet has a lower engine speed, but at 300-dpi resolution, it needs less printing time. The three printers with the Canon engine—the Digital Colorwriter LSR 2000, IBM Network Color Printer, and Lexmark Optra C—came in last of the lasers on the Excel color test. The IBM printer, with newer drivers and a newer PostScript version, was faster than the Digital printer. The Optra C came in far behind the other laser printers, most likely because of the combination of its Canon engine, its relatively slow 25-MHz AMD processor, and a meager 8MB of RAM.

On the single-page Publisher newsletter, which is a more complex page, the printer's own processor speed is much more important than it is on the simpler Excel document. The two Tektronix

printers came in first and second, thanks in large part to the 33-MHz AMD processors used to rasterize the image. The QMS magicolor WX wasn't far behind. Note that this QMS uses the CPU in the host computer (in our case, a Pentium/90) to translate the image into a collection of objects. The Intel i960 on the magicolor WX controller decompresses the incoming data and hands it off to a proprietary ASIC to rasterize it. The Digital and IBM lasers, with their 100-MHz EFI Fiery XJE raster information processors (RIPs) on-board, outperformed the Xerox printers, which each had an AMD 25-MHz controller, even though Xerox uses the faster Hitachi engine.

While none of the color ink jets reached laser speed on the Excel and Publisher tests, we were impressed by the speed of the HP DeskJet 1600CM, the fastest in that group. Note that printing a color job forces a drop in resolution for the DeskJet from 600 dpi to 300 dpi. Lexmark and Epson print at a slightly higher 360-dpi standard resolution in color, which helps explain why they trailed behind the DeskJet on the Excel color test. On the Publisher color test, the Epson Stylus 1500 trailed the other ink jets, but it printed the newsletter at 720 dpi—with superb quality.

Presentations We ran our Freelance Graphics Presentation, Photoshop Photo, and Transparency Presentation tests on all the printers we reviewed. These tests use documents that are more color-intensive than those on the Excel and Publisher tests.

For the Freelance Graphics test we produced three slides from the program in the printer's standard resolution, using its maximum paper size. These slides included both graphics and bit-mapped images. Direct speed comparisons should not be made between letter (A-size) and tabloid (B-size) output, because of the overhead associated with printing the larger tabloid media.

The top performer for color laser output on the Freelance Graphics test was the Color LaserJet, thanks to its 300-dpi resolution and AMD/40 processor. The magicolor WX came in a close second.

The two HP ink jet printers, which both use letter-size paper, finished before the tabloid-capable Lexmark and Epson ink jets. But the Lexmark Color Jetprinter 4079 Plus, which prints at 360 dpi and uses PostScript, took only a few minutes longer than the letter-size HP CopyJet M. If you want the best output, you'll have to be willing to wait for it. The two Epson ink jet printers, which both offer 720-dpi tabloid output, were much slower: Each took about an hour and a half to produce the three slides. Output quality at that resolution was stellar, though.

All of the thermal dye transfer printers print photograph-quality images at 300 dpi. The best predictor of their performance on the Freelance Graphics test was engine speed. The top three performers were the letter-size Kodak Digital Science 8650 PS (with a claimed 1-ppm engine speed), the Mitsubishi S3600-40U (0.6 ppm), and the Tektronix Phaser 440 (0.5 ppm). Each of the three printed the three slides in under 14 minutes. Among the tabloid-size group, the Mitsubishi S6600-40U outpaced the rest. The letter-size Fargo PrimeraPro and the tabloid-size Fargo Pictura 310e were both extraordinarily slow, taking about 50 minutes to produce the three Freelance Graphics pages. This is partly because of slow engine speed and partly because both are host-based printers, with all the processing taking place on the computer.

Thermal wax printing generally takes less time than thermal dye printing, as borne out by our tests. The only dedicated thermal wax transfer printer, the Tektronix Phaser 240, printed the three slides

		Freelance Graphics Presentation (Default resolution)	PhotoShop Photo (Highest resolution)	Transparency Presentation (Default resolution, letter size)
Hours:minutes:seconds				
LASER				
Digital Colorwriter LSR 2000	Letter	0:08:32 	0:27:34 	0:08:11 
HP Color LaserJet 5M	Letter	0:05:42 	0:05:24 	0:07:12 
IBM Network Color Printer	Letter	0:07:52 	0:22:06 	0:08:32 
Lexmark Optra C	Letter	0:09:49 	0:59:45 	0:18:49 
QMS magicolor WX	Letter	0:05:49 	0:02:48 	0:06:27 
QMS magicolor CX/40	Letter	0:06:23 	0:19:30 	0:06:39 
Tektronix Phaser 350 (solid ink)	Letter	0:07:44 	0:23:55 	0:07:58 
Tektronix Phaser 550	Letter	0:06:28 	0:22:55 	0:08:54 
Xerox XPrint Plus 4915	Letter	0:09:28 	0:07:33 	0:09:37 
Xerox XPrint Plus 4920	Letter	0:08:09 	0:09:28 	0:09:18 
INK JET AND THERMAL WAX TRANSFER				
Epson Stylus 1500	Tabloid	1:39:44 	0:05:28 	0:29:38 
Epson Stylus Pro XL	Tabloid	1:25:48 	0:06:49 	0:16:37 
Fargo PrimeraPro (thermal wax)	Letter	0:08:57 	0:02:36 	FAIL
Fargo Pictura 310e (thermal wax)	Tabloid	0:20:11 	0:04:39 	N/A
HP DeskJet 1600CM	Letter	0:07:22 	0:02:34 	0:13:26 
HP CopyJet M	Letter	0:15:31 	0:07:28 	0:14:59 
Lexmark Color Jetprinter 4079 Plus	Tabloid	0:20:11 	0:16:48 	0:28:36 
Seiko ColorPoint 835 PS (thermal wax)	Tabloid	0:15:02 	0:09:47 	N/A
Tektronix Phaser 240 (thermal wax)	Letter	0:09:29 	0:12:09 	0:09:41 
THERMAL DYE TRANSFER				
Eastman Kodak DS 8650 PS	Letter	0:12:24 	0:10:05 	0:11:43 
Fargo PrimeraPro	Letter	0:55:54 	0:16:04 	0:58:18 
Fargo Pictura 310e	Tabloid	0:49:48 	0:11:08 	0:48:15 
Mitsubishi S3600-40U	Letter	0:13:03 	0:11:41 	0:12:55 
Mitsubishi S6600-40U	Tabloid	0:17:30 	0:15:47 	0:14:30 
Seiko ColorPoint 835 PS	Tabloid	0:23:55 	0:18:06 	N/A
Tektronix Phaser 440	Letter	0:13:27 	0:14:20 	0:23:03 
Tektronix Phaser 480X	Tabloid	0:18:40 	0:14:30 	0:18:37 

FAIL—The printer did not complete this test

N/A—Not applicable. The printer cannot print on transparencies in this mode

in a relatively fast 9 minutes 29 seconds. The Seiko and Fargo dual-mode printers did substantially better in wax transfer mode than in dye transfer mode.

For the Transparency Presentation test, we used the same three slides as in the Freelance Graphics test, this time printed on letter-size transparency film used for overhead projectors. Though the tabloid-capable printers can handle larger sheets, we stayed with letter-size transparencies for all the printers, since very few users need to produce B-size transparencies. In general, printers will slow down when printing on transparencies. Among the color lasers, the Optra C took significantly longer than other color laser printers

(including others based on the same Canon engine).

The ink jet printers finished in much the same order as on the Freelance Graphics test. Here the speed of the two Epson printers improved substantially, presumably because of the smaller media.

With transparencies, engine speed was again the best performance predictor for thermal dye transfer printers. Be aware that each printer's claimed engine speed for A-size transparencies is quite different from its claimed speed for paper. The Kodak, for example, drops from a claimed 1 ppm to 0.32 ppm, and the Phaser 440 drops from 0.5 ppm to 0.17 ppm. Note that the Seiko printer

Continues

BENCHMARK TESTS

Minutes:seconds		Microsoft Excel Color Charts (Default resolution)	Microsoft Publisher Color Newsletter (Highest resolution)	Microsoft Word Monochrome Document (Default resolution)	Microsoft Excel Monochrome Spreadsheet (Default resolution)
LASER					
Digital Colorwriter LSR 2000	Letter	1:43	2:06	2:35	1:41
HP Color LaserJet 5M	Letter	1:24	1:45	1:03	0:49
IBM Network Color Printer	Letter	1:30	1:58	1:51	1:14
Lexmark Optra C	Letter	2:28	18:38	1:46	2:07
QMS magicolor WX	Letter	1:30	1:33	2:31	1:29
QMS magicolor CX/40	Letter	1:26	1:47	1:30	0:55
Tektronix Phaser 350 (solid ink)	Letter	0:39	1:24	1:24	1:40
Tektronix Phaser 550	Letter	1:19	1:25	1:46	1:00
Xerox XPrint Plus 4915	Letter	1:19	2:13	1:05	1:20
Xerox XPrint Plus 4920	Letter	1:28	3:17	1:01	1:15
INK JET					
Epson Stylus 1500	Letter	3:09	8:27	2:06	1:08
HP DeskJet 1600CM	Letter	2:35	1:56	1:24	2:22
HP CopyJet M	Letter	3:18	2:56	4:12	2:56
Lexmark Color Jetprinter 4078 Plus	Letter	3:42	3:41	5:55	3:30
		◀ BETTER	◀ BETTER	◀ BETTER	◀ BETTER

Continued

does not print transparencies, since it is designed exclusively for the prepress market.

Among the thermal wax transfer printers, the Phaser 240 was the only printer to yield a result. The Fargo PrimeraPro had trouble printing the last slide of the presentation, probably because the driver was not Windows 95-specific. The other printers do not support transparencies in wax mode.

Photos The Photoshop Photo test shows how well printers handle photographic bitmapped images at the printer's best resolution. Among the color laser printers, the magicolor WX managed the best time, followed by the Color LaserJet. The Phaser 550 was relatively slow, taking almost 23 minutes, primarily because it was the only printer that offered 1,200- by 1,200-dpi resolution. The Phaser 350 was also relatively slow on this test, printing at 600 by 300 dpi.

Among ink jets, the DeskJet gets its speed by printing the image at only 300 dpi. The Epson Stylus 1500 and Stylus Pro XL placed second and third, even while printing the image at 720 dpi on tabloid-size paper, partly because they use the Epson printer language rather than PCL or PostScript to compose the page.

Printer memory to process the bitmapped image proved to be a discriminating factor for the thermal dye printers. The Kodak beat out the other printers because of its 48MB of RAM. In thermal wax mode, the two Fargo printers offered the best performance on the Photoshop test, probably because as GDI printers they need to do very little processing of the bitmapped image.—*Analysis written by Denis Tom and M. David Stone*

How We Tested

We tested all printers on an HP Vectra XU Pentium/90 system running Windows 95 with spooling disabled. Though many of these printers were designed to be hooked up to a network and claim better performance when so configured, we printed directly to the parallel port to rule out any interference spooling may have had on our printer performance measurements.

The **Microsoft Excel Color Charts** test measures the printer's speed in producing a business document that mixes text and color graphics.

The **Microsoft Publisher Color Newsletter** test measures the printer's speed in producing a one-page newsletter containing text, color graphics, and a color bitmapped photo image.

The **Microsoft Word Monochrome Document** test measures the printer's speed in producing a five-page text document that uses different fonts and type sizes. The **Microsoft Excel Monochrome Document** test measures the printer's speed in producing a complex two-page spreadsheet that contains pie, bar, and line charts. We performed these tests only on printers intended to produce both color and black-and-white documents.

The **Freelance Graphics Presentation** test measures the printer's speed in producing a three-page color slide presentation containing pie charts, bar graphs, and a bitmapped photo image on a gradient-fill background. The **Transparency Presentation** test measures the printer's speed in producing the same pages on letter-size transparency film.

The **Photoshop Photo** test measures the printer's speed in producing a one-page photographic bitmapped image.



"Open mail.
Tom, the
contract arrived.
I need your
input. Bill.
Send."

INTRODUCING DESKTOP COMPUTING WITHOUT THE DESKTOP



I UNDERSTAND

The most natural interface of all is your voice. So how come you're still chained to a keyboard? Why don't you just talk to your computer while you get on with the zillion other things that need your attention? Sound impossible? Not anymore, because at IBM we've incorporated voice recognition into the best desktop operating system solution money can buy: OS/2® Warp 4. Which means you can have hands-free e-mail, voice Internet navigation, even dictation into your applications. All at the sound of your voice. So now you'll be able to get on with your work while you get out from behind your desk.

With a great new graphic interface, OS/2 Warp 4 is the ultimate network computing solution that lets you connect to almost anything, from just about anywhere. All it takes is a couple of mouse clicks and you're into your drives, printers, networks, servers and Web pages. It even comes with Java™ runtime so you can run Java applets from your desktop without a browser. And, when available, you can also download a native OS/2 Warp 4 version of Netscape Navigator™ from the Internet at no additional charge. All in all, whether you're in the office or on the road, there's no better universal client. Wherever you happen to be in the universe.

Solutions for a small planet™



GET

a free interactive demo CD that allows you to experience the benefits of "hands-free computing" by visiting our Web site at www.software.ibm.com/info/w420, or call 1 800 358-3931.



Underneath it all, we're still the same.

You may not know the name, but you'll surely recognize the face. Beginning with models launched in April, "EIZO" will become the brand name on every new Nanao monitor added to our line.

Each one will carry on the legacy of quality, innovation and performance synonymous with Nanao. In fact, the only difference you'll see is the name on the front of the bezel and the innovations that consistently put us far ahead of our competition.



EIZO monitors will continue to be developed and manufactured by Nanao. You can count on the same leading edge technology, advanced performance and superb construction you've come to expect under the Nanao brand name.

For years, Nanao monitors under the EIZO brand name have been the leading choice of discriminating corporate business users in Europe. You'll soon ask for them by the same name in the U.S.

As you can see, the more things change, the more they stay the same.



NANAO

© 1996 EIZO Nanao Technologies, Inc. • Phone: 800-800-5202, FAX: 310-530-1679 • FAX ON DEMAND: 800-416-FLEX • HomePage: <http://www.traveller.com/nanao/>
All product names are trademarks of their respective companies.

ther the CX/40 or the Xerox units, though the dithering is fairly smooth.

Paper handling on both printers is fine, though we found the manual-feed tray to be a nuisance. Rather than acting as a *supplemental* input tray, it's an *override*; you can't, for instance, leave a few transparencies stacked in the secondary input tray without the printer's blinking at you to close the door so it can print from the main tray.

Neither printer is really suited to work for which color fidelity is critical. The WX is appropriate and well priced for general office use, especially for churning out presentations. The CX/40 provides an adequate alternative to units such as the HP Color LaserJet 5M for general tasks.—Lori Grunin

QMS magicolor CX/40. List price: \$8,499.
QMS magicolor WX. List price: \$3,999. QMS Inc., Mobile, AL; 800-523-2696, 334-633-4300; fax, 334-633-4866; www.qms.com. Circle 449 on reader service card.

Tektronix Inc.

Tektronix Phaser 350, Tektronix Phaser 550



Tektronix offers two printers in the color laser printer category, and both of them merit Editors' Choice status. The Tektronix Phaser 550 color laser (\$6,995 list, \$6,300 street) offers 1,200-dpi resolution, reasonably fast performance, and impressive output quality. That makes it a prime choice for anyone who wants to print graphics and photographs on plain paper, with or without black text on the same page. The Tektronix Phaser 350, which is a solid-ink printer, offers 600- by 300-dpi resolution and lower output quality. But it also offers fast performance and a budget price: \$3,495 list or \$3,150 street. Note that the basic units offer no network support, but internal Ethernet and Token-Ring options are both available.

If you thought you were in the market for a color laser printer, you should consider the solid-ink 350. It's much easier to set up and keep going than most color laser printers. The printer comes with its wax-based ink already loaded. To set it up, you plug it in, slide in a tray that collects excess wax, and load paper. When it's low on wax, it alerts you at the front panel so

you can open the cover and drop more wax blocks into the keyed slots. (One drawback: If you turn the printer off and allow the wax to solidify, you'll have to wait about 15 minutes for it to melt again.)

Not only is the 350 less expensive than any of the true laser printers, but full-color pages range in cost from a claimed 5 cents per page for 10 percent coverage up to 27 cents for 75 percent coverage—about half the cost of similar pages for most lasers in this roundup. (Tektronix is also offering black ink for free, a promotion the company says will continue for the foreseeable future.)

For graphics, the 350 offers brilliant colors, sharp edges, solid lines, completely filled in areas of color, and gradients that are free of banding. The error-diffusion dithering shows as a speckled effect on solid areas, which some purists might not like. Photos are grainy and slightly posterized, but they approach photographic quality at arms' length. Text is laser quality. The 350 has a claimed engine speed of 6 ppm in its fastest color mode. It came in as one of the fastest laser-class printers

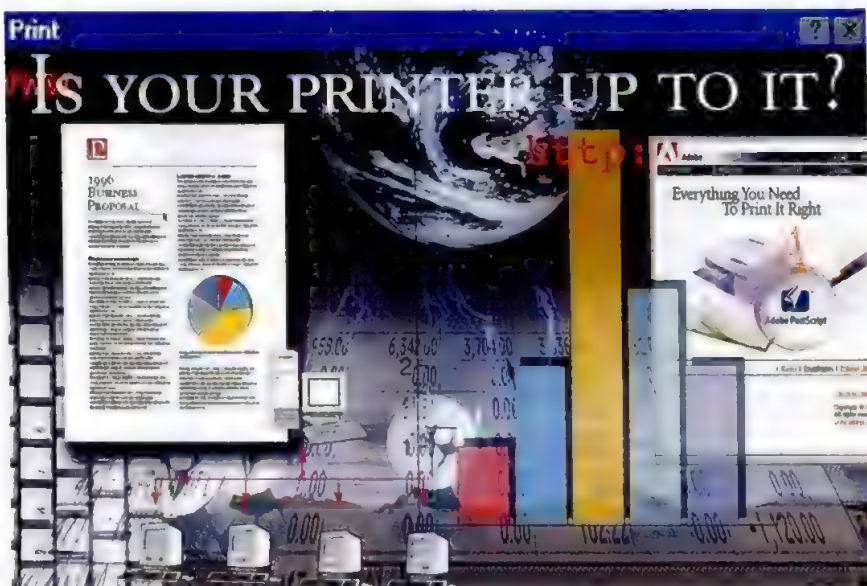


Tektronix Phaser 350, Phaser 550

overall in our tests.

The 550, which uses an engine from ISME (a subsidiary of Matsushita), is easier to set up than most color laser printers are. Slide in the imaging unit, the fuser, and four toner cartridges, then load paper and install the driver. With a claimed 10,000 pages per cartridge for the black toner and 8,000 pages per cartridge for the colors, you won't have to change cartridges very often.

Output quality is superb—the best



Adobe PostScript

FROM SIMPLE TEXT TO COMPLEX GRAPHICS, TO THE WEB AND BEYOND,
MAKE SURE YOUR PRINTER HAS ADOBE POSTSCRIPT.

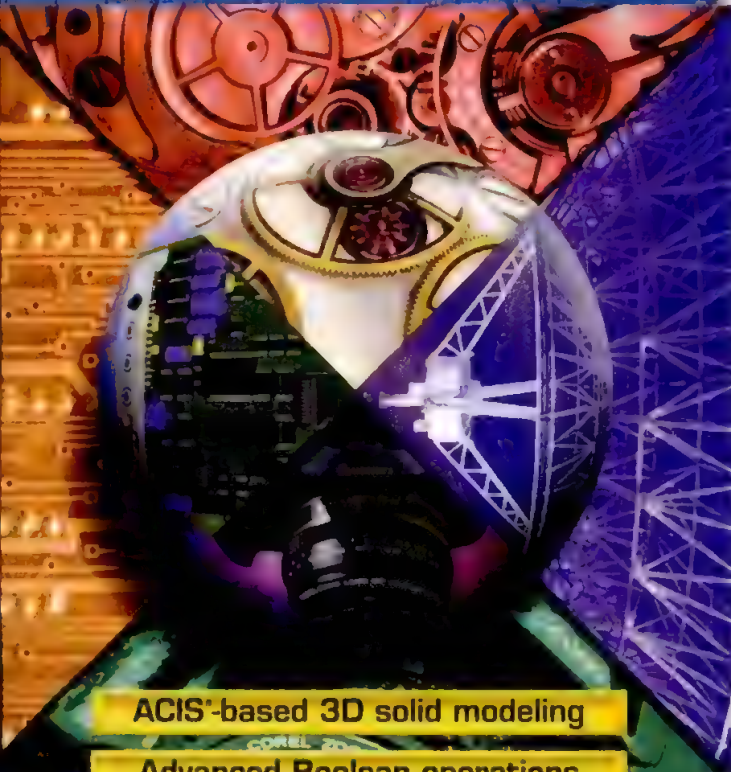
For more information: www.adobe.com/print or call 1-800-833-6687 ext. 24206

Adobe, PostScript, and the PostScript logo are trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions. ©1996 Adobe Systems Incorporated. All rights reserved.



FROM THE MAKERS OF CorelDRAW

Precision 32-Bit 3D Solid Modeling



ACIS®-based 3D solid modeling

Advanced Boolean operations

Realistic materials and rendering

Customizable user interface

Includes:

- CorelCAD™
- Corel Print Space™
- Corel DREAM 3D 6
- Corel MULTIMEDIA MANAGER™ 6
- Corel SCRIPT™

Plus:



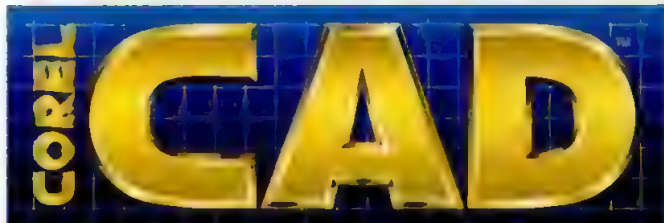
- 7,000+ 2D drafting symbols
- 600+ 3D symbols
- 200+ house plans
- 750+ three dimensional models for Corel DREAM 3D 6
- 200+ Corel Professional Photos on CD-ROM backgrounds for Corel DREAM 3D 6
- 750 seamless bitmap tiles for Corel DREAM 3D 6
- 100 sample drawings
- 120 TrueType™ fonts
- Corel House Select™
- CorelMEMO



Corel and CorelCAD are trademarks or registered trademarks of Corel Corporation in Canada, the United States and/or other countries. ACIS is a registered trademark of Spatial Technology Inc. All other product and company names and trademarks are registered trademarks of their respective companies.



Corel, Official World Title Sponsor of the COREL WTA TOUR



For Windows® 95 and Windows NT™ CD-ROM Version

CorelCAD™ is a 32-bit design tool that allows easy, accurate modeling of real world objects in 3D. A fully customizable interface and the industry-standard ACIS® solid modeling system will give you the flexibility to conceptualize, construct and revise product models and prototypes on the PC. Powerful Boolean operations, advanced blending, extrusions and 2D drafting features will help make your ideas a reality. Exceptional rendering capabilities let you view models with realistic shading and textures, while an extensive collection of symbols, models and utilities provide incredible value. Add a whole new dimension to all your design projects with CorelCAD™!

Create logical groupings of your layers and display only the layers in that group.

View models in a Hidden Line view. Hidden lines can also be displayed as dotted lines.

Manage your drawing by using layers to control visibility, printability, color and locked status of each layer.

View list gives you quick access to predefined viewing angles, or create your own custom views.

Record commands and replay as a macro—ideal for automating repetitive tasks.

Customizable toolbars give you quick access to different tools.

Color palette gives you quick access to colors for your models.

Status line gives you information on the selected objects and step-by-step prompts to guide you through commands.

MIDI support allows you to display different views of the same drawing or have several drawings open at the same time.

Render entire drawing. Selected objects or portions of the screen.

Insert Point Roll-up allows you to place points precisely, using a Cartesian or Polar coordinate system.

Apply realistic material textures to your models, and render your models with up to 8 different light sources.

Corel Print Space™

Lay out your model drawings for printing by creating a viewport, placing your model, controlling the projection, rendering quality and scale of each viewport individually.

Draw on your Corel Print Space™ layout using lines, curves, shapes and freehand drawing tools.

Add impact to your layout by adding color fills, shadows and outlines.

Create and format text for your printed drawing. Use tabs, bullets, automatic hyphenation, spell checker, Thesaurus and Type Assist.

Insert objects from any OLE server.

From simple shapes, create intricate objects by using Boolean operations to add, subtract or intersect multiple objects. Project 2D shapes into 3D by using extrude or sweep.

CIRCLE 258 ON READER SERVICE CARD

Since 1982
ComputAbility
Computer Electronics
Call Now!
1-800-554-1635

Competitive
upgrade
CD-ROM
Version!
\$235
Full
CD-ROM
Version
\$585

*US\$ plus applicable taxes and shipping.

*For CorelDRAW™, AutoCAD™, Generic CAD™, Corel Vistas CAD™, MicroStation™ and CADKEY™



<http://www.corel.com>

KUR-0123

HARDWARE

Color Printers

we've seen from a color laser. Photos are just one step shy of true photographic quality. Graphics offer sharp edges, smooth gradients, and solid thin lines. Most important, you won't see the thin light or dark bands along the edges of solid areas that mar the output from most color laser printers. Text is as crisp and clean as what you would expect from a 600-dpi monochrome laser printer. Note too that in most of our print speed tests the 550 came in first or second among 600-dpi PostScript laser printers.

Each of these printers is impressive in its own way. If you're looking for laser-class quality on a tight budget, the Phaser 350 is a laser printer killer that should turn your head. If you're looking for the highest-quality color laser output regardless of cost, the Phaser 550 is a printer that others have to beat.—MDS

Tektronix Phaser 350. List price: \$3,495. **Tektronix Phaser 550.** List price: \$6,995. Tektronix Inc., Wilsonville, OR; 800-835-6100, 503-682-7377; fax, 503-682-2980; www.tek.com/color_printers/. Circle 452 on reader service card.

Xerox Corp.

XPrint Plus 4915, XPrint Plus 4920

With their high-capacity paper-handling options and respectable speed, the affordable Xerox XPrint Plus 4915 (\$4,995 list, \$4,500 street) and XPrint Plus 4920 (\$7,295 list, \$6,500 street) are fine for general office use and for cranking out reports and presentations in a high-traffic environment. Like the QMS magicolors—the other Hitachi-based printers reviewed here—these printers are not really suited for color-critical work.

The primary hardware difference between the 4920 and the 4915 is the resolution: The 4920 uses a true 600- by 600-dpi engine, while the 4915's produces 1,200 by 300 dpi. The Xerox printers arrive with the consumables already installed; hardware setup consists primarily of pulling some plastic tabs and shaking the toner.

In addition, we tested two accessories: the 1,500-page input bin (\$1,499 list) and the 1,000-sheet high-capacity output stacker (\$499 list). The stacker is easy to install. The input tray, which is built into a rolling cabinet, isn't quite so simple. After placing



Xerox Xprint Plus 4920

the printer atop the cabinet, you must install two grounding plates by pulling off one side panel and dislodging the other.

On our print speed tests, the Xerox units performed well with business applications, such as Excel and Word, trailing only the Tektronix printers. Because of the extra 8MB of RAM we installed, the 4915 outpaced the 4920 on graphics applications. Unfortunately, the 4915 could not handle our Freelance Graphics Presentation test; a driver bug consistently generated the slides improperly.

We liked the costlier 4920's print quality better than the 4915's. Even after we adjusted the 4915's black density setting,

black text was a bit smudgy. The 4915's output more closely resembles 300 dpi than 600 dpi, and forcing the driver to print at 1,200 dpi yielded splotchy, unusable prints. Both printers generated high-quality graphics with smooth gradient fills and images acceptable for business use, using the stochastic setting. Xerox's Intelligent Color algorithm defaults to a satisfactory Quad Dot setting for halftones, however.

If you're deciding between the Xeroxes and the QMS units, note that the XPrint Plus 4915 is more expensive than the QMS magicolor WX and doesn't deliver superior print quality. Unless you need PostScript support, the QMS may be the better choice. The XPrint Plus 4920, on the other hand, is priced competitively against the QMS magicolor CX/40 (when configured with the same amount of memory), slightly outpaces it, and produces equivalent output quality.—LG

XPrint Plus 4915. List price: \$4,995. **XPrint Plus 4920.** List price: \$7,295. Xerox Corp., Rochester, NY; 800-349-3769, 716-264-5410; fax, 716-264-5410; www.xerox.com. Circle 453 on reader service card.



Adobe PostScript

WHY FISH FOR GREAT COLOR?

MAKE SURE YOUR PRINTER HAS ADOBE POSTSCRIPT.

For more information: www.adobe.com/print or call 1-800-833-6687 ext. 24206

Adobe, PostScript, and the PostScript logo are trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions. ©1996 Adobe Systems Incorporated. All rights reserved.



Simple
solutions...

...for global
communications.



NewCom brings you together.

You're in New York. Your design team is in Tokyo. With remarkable Digital Simultaneous Voice Data modems (DSVD) an ordinary analog phone line is all you need to collaborate. No expensive ISDN or T-1 lines needed, no quirky, hybrid modems; it's easily configured. Talk and send/receive data at the same time. Duplex technology makes voices from halfway around the world sound like they're next door. And NewCom quality modem design speeds your data at rates up to 28,800 Kbps.

The NewTalk 2000 family of DSVD modems for embedded applications responds instantly to the

demands of virtually all applications, from spreadsheets to word processing, from page design to multi-media. And at the end of the day, use NewTalk's remote gaming applications for remarkably lifelike game play with competitors on all parts of the globe.

NewCom also manufactures superior full duplex Speakerphone, Voicemail and Data/Fax modems for PC's in a configuration that's just right for your business or home.

Call 1-800-5NewCom.



NEWCOMTM

Your.lift.2.the.info.superhwy.

NewCom, Inc., a subsidiary of Aura Systems, Inc. • 31166 Via Colinas, Westlake Village, CA 91362 Tel (818) 597-3200 • Fax (818) 597-3210
<http://www.newcominc.com>

CIRCLE 036 ON READER SERVICE CARD

INK JET & THERMAL
WAX PRINTERS

Epson America Inc.

Stylus 1500, Stylus Pro XL



If you need tabloid-size color output at ink jet prices and are willing to wait for it, either of the Epson America offerings is a good choice. The general-purpose Stylus 1500 (\$1,199 list, \$1,100 street) handles up to C-size paper (17 by 22 inches) and sports a built-in tractor feed. Epson intends it for workgroups that need wide-carriage monochrome output (for ledgers and the like) plus color that is good enough for typical business use. The Stylus Pro XL (\$2,125 list, \$2,000 street) handles up to 11- by 17-inch paper and is meant as a prepress proofing tool for graphic artists who can't afford a thermal dye proofing device. Both of these four-color units use Epson's unique piezoelectric ink jet technology to generate fine output of up to 720 dpi, though graphics at that resolution take a while to print.

Both of the machines are easy to set up, although we disliked the confusing control panel sequences necessary to install ink cartridges and perform other tasks. Epson's drivers, which include a spooler utility that lets you restart or reprint jobs in the queue, are generally good. Our one complaint is with the Pro XL's PostScript implementation. It uses a \$350 software RIP from Birmy, which produces excellent-quality output. But because it uses the host CPU, printing graphics-intensive images requires you either to dedicate a machine as a print server or to run jobs off your local machine as an overnight batch. Also, we often received "out of memory"

messages when printing large files.

The Stylus 1500 falls neatly into the workhorse niche. Relatively speedy, its margin behind the category leader (the letter-size HP DeskJet 1600 CM) was acceptable on most of our print speed tests. The Stylus 1500 fell behind on more difficult tasks such as the Freelance Graphics Presentation test, in which it took a long 1 hour 40 minutes to produce three slides. It handled all the paper sizes and types we tested without incident. The Stylus 1500 prints a maximum of 360 dpi on plain paper; 720-dpi printing requires Epson's special paper (\$14.49 for 100 letter-size sheets). Output quality on regular copier paper is more than adequate for everyday business use, and the graphics are exceptional on 10-cent-a-sheet ink jet stock and buck-a-sheet glossy paper.

For graphics-intensive use, the Pro XL is a better choice. It prints 720 dpi on plain paper, and on coated paper it comes very close to continuous-tone quality in PostScript. (Epson's native-language output was good, though not as good as PostScript.) Here again throughput may be a

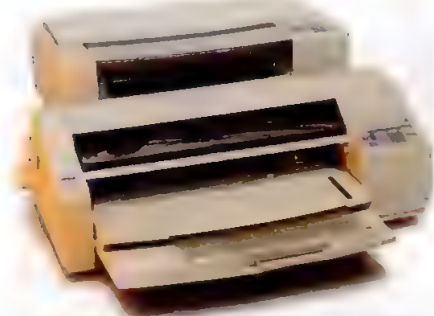
concern. It took almost an hour and a half for the Pro XL to complete our Freelance Graphics Presentation test at 720 dpi.

When Epson's patented piezoelectric technology functions properly, the machines print well. Unfortunately, when it doesn't, it leaves you with striped, unusable output from severe printhead clogging. After much use and cleaning, these clogs eventually clear, but you end up wasting a lot of ink—and time.

Both models use a three-color ink cartridge plus a separate black cartridge. These printers also have a slightly larger unprintable area than most of the others we tested (except the thermal dyes); you lose about an extra quarter of an inch at the bottom.

For flexible office printing with high-quality graphics, the Stylus 1500 is a good choice. And if you don't mind pampering your graphics printer a bit and planning your lunch hour around large print jobs, you'll probably be happy with the Stylus Pro XL as an inexpensive comping device.—LG

Stylus 1500. List price: \$1,199. **Stylus Pro XL.**



Epson Stylus 1500, Stylus Pro XL

CONGRATULATIONS TEKTRONIX
ON YOUR AWARD WINNING
PHASER 340 PRINTER.

Tektronix



Adobe PostScript

IF YOU THINK THE 340 IS HOT, THE NEW PHASER 350 WILL BLOW YOU AWAY.
MAKE SURE YOUR PRINTER HAS ADOBE POSTSCRIPT.

For more information: www.tek.com or call 1-800-TEKWIDE

Adobe, PostScript, and the PostScript logo are trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions. ©1996 Adobe Systems Incorporated. All rights reserved.
CIRCLE 252 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

OUR TWO-LINE MODEM

Our Two-Line

ALLOWS YOU TO TALK

Modem Allows You To Talk

WHILE YOU FAX,

While You Fax, Scan While

SCAN WHILE YOU TALK,

You Talk, Talk While You

TALK WHILE YOU

Surf The Net, Scan

SURF THE NET, SCAN

While You Fax,

WHILE YOU FAX,

Fax While You Talk...



pentium®
PROCESSOR

©1996 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. Presario is a trademark of Compaq Computer Corporation. The Intel Inside Logo and Pentium are registered trademarks and the Pentium Processor Logo is a trademark of Intel Corporation. Other products mentioned may be trademarks or registered trademarks of their respective companies.

COMPAQ

Has It Changed Your Life Yet?

WELL, YOU GET THE IDEA.



Introducing the *Fortune 500*®

home office. Otherwise known as the Compaq Presario 6000 Series. You could say it was inspired by one simple yet bold idea: to help you be just as professional at home as you would be in any big business setting. In other words, the Presario 6000 Series is loaded with features that empower you by making you more productive and efficient.

Take our two-line 33.6Kbps modem. Not only does it allow you to perform multiple communications at once—like faxing one client while speaking with another—it provides the fastest Internet access available over standard phone lines.

And since document management is important in any office, our keyboard comes equipped with one rather extraordinary feature: a built-in scanner.

So you can scan notes and articles, store receipts, copy faxes—all literally at your fingertips.

And to assist in preparing reports, presentations, spreadsheets and everything in between, the Compaq Presario 6000 Series comes with the latest business software. Like Microsoft Word and Microsoft PowerPoint, Corel Draw 5.0 and Lotus 1-2-3.



*The home office will never be the same again.
Introducing the Compaq Presario 6000 Series.*

We've even put in JBL Pro speakers and MPEG video playback for incredible sound and full-motion video. After all, we had to mix a little pleasure with all the business you'll soon be doing. To learn more, visit us at www.compaq.com or call 1-800-345-1518.

SUMMARY OF FEATURES

Color Printers

PC MAGAZINE
EDITOR'S CHOICE

■ YES ■ NO □ OPTIONAL

Products listed in review order

LASERS

	Digital Colorwriter LSR 2000	HP Color LaserJet 5M	IBM Network Color Printer	Lexmark Optra C	QMS magicolor WX	QMS magicolor CX/40	Tektronix Phaser 350
List/street price	\$10,699/\$9,000	\$9,195/\$7,400	\$8,999/\$7,500	\$6,849/\$6,400	\$3,999/\$3,600	\$8,499/\$7,850	\$3,495/\$3,150
Technology	Laser	Laser	Laser	Laser	Laser	Laser	Solid ink
Standard/maximum RAM	32MB, 48MB	36MB, 76MB	16MB, 48MB	8MB, 64MB	4MB, 32MB	40MB, 64MB	8MB, 24MB
Tested RAM	32MB	36MB	16MB	8MB	4MB	40MB	24MB
Printer resolution in color with standard RAM (dpi)	600 x 600	300 x 300	600 x 600	600 x 600	600 x 600	1,200 x 1,200	300 x 300
Printer resolution in color with maximum RAM (dpi)	600 x 600	300 x 300	600 x 600	600 x 600	600 x 600	1,200 x 1,200	600 x 300
Number of colors used for color printing	4	4	4	4	4	4	4
Rated color speed: fastest mode/quality mode (ppm)	3, 3	3, 3	3, 3	3, 3	5, 5	5, 5	6, 2
Rated monochrome speed: fastest mode/quality mode (ppm)	12, 12	10, 10	12, 12	12, 12	12, 12	12, 12	6, 2
Engine manufacturer	Canon	Konica	Canon	Canon	Hitachi	Hitachi	Tektronix
Processor type/speed (MHz)	EFI Fiery/100	AMD RISC/40	MIPS RISC/100	AMD RISC/25	Intel RISC/16	IDT RISC/40	AMD RISC/33
Paper Handling and Interfaces							
Capacity of each standard input tray (sheets)	350	250	250	250	250	250	200
Maximum printable area in color mode (inches)	8.1 x 10.4 (letter)	8.0 x 10.5 (letter)	8.0 x 10.5 (letter)	8.0 x 10.5 (letter)	8.1 x 10.6 (letter)	8.1 x 10.6 (letter)	8.1 x 10.5 (letter)
Serial/parallel port	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	□ ■
Bidirectional/ECP parallel support	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
C-size parallel port/LocalTalk port/SCSI port	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Ethernet/Token-Ring adapter	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Printer-specific Windows 95 driver/Windows 3.1 driver	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Printer-specific Windows NT driver, OS/2 driver	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Features, Consumables, and Support							
Resolution enhancement for edges/for dithering	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Supports HP PCL 5/Adobe PostScript Level 2	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
RAM required on PC for host-based printing	N/A	N/A	N/A	N/A	16MB	N/A	N/A
Pantone-certified	■	■	■	■	■	■	■
Other color management support	ColorSync, EFIColor, Kodak, Windows 95 ICM	HP Image Ret 1200	EFIColor	AGFA, ColorSync, 2.0, FotoTune, Windows 95 ICM	ColorSync, Windows 95 ICM	ColorSync, Windows 95 ICM	ColorSync, TekColor
Rated life of toner or ribbon (number of color pages)	4,000	3,000	4,000	4,000	5,000	4,000	4,000
Claimed cost per page:							
5 percent coverage (monochrome text)	4¢	1.8¢	4.3¢	3.8¢	2¢	2¢	1.5¢
10 percent/25 percent coverage (color)	12¢/23¢	3.3¢/7.5¢	8.6¢/19.7¢	12¢/24¢	9¢/19¢	9¢/19¢	5¢/10¢
50 percent/75 percent coverage (color)	40¢/57¢	17¢/25¢	39¢/59¢	40¢/60¢	36¢/52¢	36¢/52¢	19¢/27¢
Web information and support site	www.printers.digital.com	www.hp.com	www.can.ibm.com/ibmprinters	www.lexmark.com	www.qms.com	www.qms.com	www.tek.com/color_printers/
Warranty term (parts and labor)	1 year	1 year	1 year	1 year	90 days (on-site)	90 days (on-site)	1 year

N/A—Not applicable: The product does not have this feature

List price: \$2,125. Epson America Inc., Torrance, CA; 800-463-7766, 310-782-0770; fax, 310-782-5220; www.epson.com. Circle 442 on reader service card.

Hewlett-Packard Co.

HP CopyJet M, HP DeskJet 1600 CM

The workgroup-oriented HP DeskJet 1600 CM (\$2,479 list, \$2,000 street) and HP CopyJet M (\$2,950 list, \$2,500 street) ink jet printers, from Hewlett-Packard Co., are dependable and reasonably priced. They offer dual PCL 5C and PostScript support, as well as built-in JetDirect network adapters,

which add to their flexibility. But while they are ideal for an office environment where users need both monochrome and color output, neither offers stellar print quality; they can manage 600 dpi in monochrome but only 300 dpi in color.

With the ability to act as a walk-up copy machine, the CopyJet M stands out from the crowd; in a small office it's a real convenience to have the two combined in a single footprint. The front panel controls offer all the scaling and density adjustments one expects from a copier, and you can make copies while another job is printing (your page is saved to memory). We were disappointed by the fact that you can't use the copi-

er as a real scanner, however.

We found the CopyJet M's print quality, paper handling (to legal size), and speed acceptable for general business documents and presentations, but



HP DeskJet 1600 CM, HP CopyJet M

PC MAGAZINE

EDITORS' CHOICE

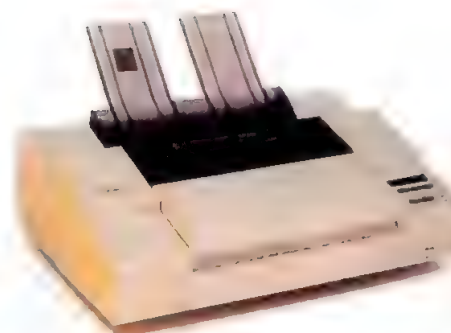
Tektronix Phaser 550	Xerox XPrint Plus 4915	Xerox XPrint Plus 4920
\$6,995/\$6,300	\$4,995/\$4,500	\$7,295/\$6,500
Laser	Laser	Laser
8MB, 72MB	16MB, 48MB	16MB, 48MB
24MB	16MB	24MB
600 x 600	1,200 x 300	600 x 600
1,200 x 1,200	1,200 x 300	600 x 600
4	4	4
5, 2	6, 3	6, 3
14, 7	12, 12	12, 12
KME	Hitachi	Hitachi
AMD RISC/33	AMD RISC/25	AMD RISC/25
250	250	250
8.2 x 13.5 (legal)	8.3 x 10.8 (letter)	8.3 x 10.8 (letter)
		
		
N/A	N/A	N/A
ColorSync, TekColor	ColorSync, Windows 95 ICM	ColorSync, Windows 95 ICM
8,000	4,000	4,000
5¢	3.8¢	2.9¢
15¢/21¢	15¢/27¢	13¢/23¢
31¢/41¢	47¢/67¢	41¢/58¢
www.tek.com/ color_printers/	www.xerox.com	www.xerox.com
1 year	1 year (on-site)	1 year (on-site)

This held true for the DeskJet 1600 CM as well. Designed to be a shared ink jet workhorse, it was the fastest performer on many of our tests, and we had fewer problems with it than with the Epson Stylus 1500, its closest competitor. Monochrome output is excellent, but color print quality is just acceptable. And despite heating the paper on the way out—or perhaps because of it—glossy pages emerged significantly wrinkled.

HP CopyJet M. List price: \$2,950. **HP DeskJet 1600CM.** List price: \$2,479. Hewlett-Packard Co., Santa Clara, CA; 800-752-0900; fax, 415-857-5518; www.hp.com. *Circle 444 on reader service card.*

Lexmark Color Jetprinter 4079 Plus

The 4079 Plus lives up to Lexmark's reputation for easy setup, with excellent drivers and plenty of network options. In-

**Lexmark 4079 Plus**

Lexmark Color Jetprinter 4079 Plus. List price: \$3,199. Lexmark International Inc., Lexington, KY; 800-891-0331, 606-232-2000; fax, 606-232-2380; www.lexmark.com. *Circle 447 on reader service card.*



We gave PC Magazine an AST Ascentia J.

Ascentia J50 • 133MHz Pentium® processor, 10.4" SVGA TFT, 2 Type II or 1 Type III PC card slots, 800 MB removable hard drive, built-in 16-bit CD quality audio, integrated 14.4 modem, Lithium Ion battery, weight: 5.8 lbs.

Pardon our excitement, but the AST® Ascentia™ J just beat out 20 competitors to win the coveted PC Magazine Editors' Choice™ award. We couldn't be prouder...well, actually we could. Because this is just one of several awards that have been bestowed upon the Ascentia J, including the PC Week Analyst's Choice award and

*Estimated selling price based on Ascentia J50. Actual price may vary. Contact your reseller for details. © 1996 AST Research, Inc. AST is a registered trademark. AST Computer, the AST logo, Ascentia and "Where Things are Happening" are trademarks of AST Research, Inc. Intel, Pentium, and the Intel Inside logo are registered trademarks of Intel Corporation.



August 1996 • Ascentia 750

What we got in return was priceless.

Windows Magazine 100 best products. So why don't you see for yourself what the experts are raving about. And while you're at it, check out the Ascentia P, with head-turning features like a swappable CD-ROM drive. In the meantime, go ahead and open up an AST Ascentia or a PC Magazine. Both will show you just how impressive we are. Call 1-800-876-4AST or visit us at www.ast.com.

Intel and the Pentium Processor logo is a trademark of Intel Corporation. All other products or services mentioned herein may be trademarks or registered trademarks of their respective owners. Information subject to change without notice.



Where things are

HAPPENING™ ▲

CIRCLE 122 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

SUMMARY OF FEATURES

Color Printers

PC MAGAZINE
EDITORS' CHOICE

■ YES ■ NO □ OPTIONAL

Products listed in review order

	Epson Stylus 1500	Epson Stylus Pro XL	HP DeskJet 1600CM	HP CopyJet M	Lexmark Color Jetprinter 4075 Plus	Tektronix Phaser 240	Eastman Kodak Digital Science 8650 PS
List/street price	\$1,199/\$1,100	\$2,125/\$2,000	\$2,479/\$2,000	\$2,950/\$2,500	\$3,199/\$2,600	\$3,695/\$3,330	\$10,795/\$9,500
Technology	Ink jet	Ink jet	Ink jet	Ink jet	Ink jet	Thermal wax	Thermal dye
Standard/maximum RAM	N/A	N/A	6MB, 70MB	7MB, 39MB	4MB, 36MB	5MB, 21MB	48MB, 64MB
Tested RAM	N/A	N/A	6MB	7MB	12MB	13MB	48MB
Printer resolution in color with standard RAM (dpi)	720 x 720	720 x 720	300 x 300	300 x 300	360 x 360	300 x 300	300 x 300
Printer resolution in color with maximum RAM (dpi)	720 x 720	720 x 720	300 x 300	300 x 300	360 x 360	300 x 600	300 x 300
Number of colors used for color printing	4	4	4	4	4	3 or 4	3 or 4
Rated color speed: fastest mode/quality mode (ppm)	1, 1	1, 1	4, 1	1.5, 0.5	1, 1	2, 1	1, 1
Rated monochrome speed: fastest mode/quality mode (ppm)	1, 1	3, 3	9, 8	7, 4	1.7, 1.7	Not rated	Not rated
Engine manufacturer	Epson	Epson	HP	HP	Canon	Tektronix	Eastman Kodak
Processor type/speed (MHz)	None	None	Intel RISC/20	Intel RISC/33	AMD RISC/25	AMD RISC/16	MIPS RISC/33
Paper Handling and Interfaces							
Capacity of each standard input tray (sheets)	100	100	180	180	100	100	100
Maximum printable area (inches)	13.6 x 21.8 (C-size)	12.8 x 18.3 (tabloid)	8.2 x 13.7 (legal)	8.2 x 13.7 (legal)	11 x 17 (tabloid)	8.1 x 10.8 (letter)	8.5 x 12.0 (legal)
Serial/parallel port	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Bidirectional/ECP parallel support	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
C-size parallel port/LocalTalk port/SCSI port	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Ethernet/Token-Ring adapter	■ □	■ □	■ □	■ □	■ ■	□ ■	■ ■
Printer-specific Windows 95 driver/Windows 3.1 driver	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Printer-specific Windows NT driver, OS/2 driver	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Features, Consumables, and Support							
Resolution enhancement for edges/for dithering	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ N/A
Supports HP PCL 5/Adobe PostScript Level 2	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
RAM required on PC for host-based printing	8MB	8MB	N/A	N/A	N/A	N/A	N/A
Pantone-certified	■	■	■	■	■	■	■
Other color management support	None	None	HP Color Smart	HP Color Smart	AGFA, Color-Grade, ColorSync	Apple, CIE Intel, TekColor	EFIColor, Kodak Ultracolor
Rated life of toner or ribbon (number of color pages)	320	670	1,600	1,800	200	342	85
Claimed cost per page:							
5 percent coverage (monochrome text)	2¢	2¢	2.5¢	3¢	3¢	N/A	N/A
10 percent/25 percent coverage (color)	3¢/8¢	6¢/16¢	4.2¢/10.5¢	4.5¢/11¢	10¢/25¢	56¢	\$3.25
50 percent/75 percent coverage (color)	16¢/25¢	33¢/50¢	21¢/30¢	22¢/33¢	50¢/75¢	56¢	\$3.25
Web information and support site	www.epson.com	www.epson.com	www.hp.com	www.hp.com	www.lexmark.com	www.tek.com/color_printers/	www.kodak.com
Warranty term (parts and labor)	2 years	2 years	1 year	1 year	1 year	1 year	1 year

N/A—Not applicable: This product does not have this feature.

Tektronix Inc.

Phaser 240

Thermal wax printers have gradually lost ground to ink jet and laser technologies in the business marketplace, which explains why Tektronix's A-size Phaser 240 (\$3,695 list, \$3,330 street), a past Editors' Choice, is the only dedicated thermal wax printer in this roundup. Whatever its limitations compared to ink jet and laser printers, however, the Phaser 240, with 600- by 300-dpi resolution, can certainly do what thermal wax printers have always done well: offer brilliant graphics, particularly for transparencies. It's a reasonable

choice as a workaholic presentation printer.

Setting up the Phaser 240 is standard and simple: Install the ribbon, load the paper, install the PostScript driver, and you're ready to print. The only network support in the base-price printer is for LocalTalk, but you can obtain optional support for EtherTalk, NetWare, and TCP/IP. The Phaser 240's paper tray handles only 100 sheets of paper (accommodating only standard letter-size sheets), less than most of the other printers in this category.

Output quality is better than average for thermal wax printing. Photos are a bit grainy and exhibit slight posteriza-

tion, but there are no obvious dithering patterns. Tektronix employs a sophisticated dithering scheme that makes such patterns much less obvious than you would expect from the resolution, which



Tektronix Phaser 240

Ends

PC MAGAZINE
EDITORS' CHOICE

DYE TRANSFER

Fargo PrimeraPro	Fargo Pictura 310e	Mitsubishi \$3600-40U	Mitsubishi \$6600-40U	Seiko ColorPoint \$35 PS	Tektronix Phaser 440	Tektronix Phaser 480X
\$1,895/\$1,500	\$5,995/\$5,000	\$8,995/\$8,500	\$14,995/\$12,000	\$16,499/\$15,500	\$7,995/\$7,200	\$9,995/\$9,000
Thermal dye/wax	Thermal dye/wax	Thermal dye	Thermal dye	Thermal dye/wax	Thermal dye	Thermal dye
N/A	N/A	12MB, 12MB	24MB, 24MB	28MB, 136MB	16MB, 64MB	32MB, 112MB
N/A	N/A	12MB	24MB	28MB	32MB	96MB
600 x 300	600 x 300	300 x 300	300 x 300	300 x 300	300 x 300	300 x 300
600 x 300	600 x 300	300 x 300	300 x 300	300 x 300	300 x 300	300 x 300
3 or 4	3 or 4	3 or 4	3 or 4	3 or 4	3 or 4	3 or 4
0.3, 0.1	0.3, 0.1	0.6, 0.6	0.3, 0.3	0.3, 0.2	0.5, 0.4	0.4, 0.4
Not rated	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
Fargo	Fargo	Mitsubishi	Mitsubishi	Seiko	Tektronix	Tektronix
None	None	AMD RISC/25	AMD RISC/25	Intel RISC/33	AMD RISC/24	AMD RISC/24
20 thermal dye, 40 thermal wax	65 thermal dye, 135 thermal wax	30	60	100	50	60
8.5 x 11.3 (letter)	11.9 x 17.4 (tabloid)	8.2 x 11.7 (letter)	11.9 x 17.2 (tabloid)	12.1 x 18.0 (tabloid)	9.3 x 12.7 (legal)	11.9 x 17.2 (tabloid)
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
■ N/A	■ N/A	■ N/A	■ N/A	■ N/A	■ N/A	■ N/A
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
16MB	32MB	N/A	N/A	N/A	N/A	N/A
■	■	■	■	■	■	■
Fargo Color	Fargo Color	ColorSync	ColorSync	MatchPoint	CIE, ColorSync, TekColor	CIE, ColorSync, TekColor
50	50	100	275	100	100	215
N/A	N/A	N/A	N/A	N/A	N/A	N/A
\$2.74	\$8.50	\$2.87	\$8.49	\$9.75	\$2.48	\$6.66
\$2.74	\$6.50	\$2.87	\$6.49	\$9.75	\$2.48	\$6.66
www.fargo.com	www.fargo.com	www.mitsubishi- imaging.com	www.mitsubishi- imaging.com	www.cgg.seiko- imaging.com	www.tek.com/ color_printers/	www.tek.com/ color_printers/
1 year	1 year	1 year	1 year	1 year	1 year	1 year

is 300 by 300 in standard mode or 600 by 300 in best mode. Graphics have fully saturated colors, sharp edges, and gradients without banding.

Claimed engine speed for the Phaser 240's color output is 2 ppm at 300 by 300 dpi and 1 ppm at 600 by 300 dpi. As expected, the machine's print times on our test suite generally trailed those of the color laser and letter-size ink jet printers and topped those of the thermal dye units. The Phaser 240 was especially quick on our Transparency Presentation test—its bread-and-butter—needing just 9 minutes 41 seconds to produce the three slides.

One noteworthy feature is the Phaser

240's ColorCoat ribbon. This three-color ribbon lays down a coating to let you print on standard paper; as with traditional thermal wax printers, you can use standard ribbons and special-purpose paper instead.

Ultimately, the Phaser 240 is pretty much a one-trick pony. If you need a printer specifically for business presentations on paper or transparencies, it will do a fine job. But don't plan to use it for much else.—MDS

Phaser 240. List price: \$3,695. Tektronix Inc., Wilsonville, OR; 800-835-6100, 503-682-7377; fax, 503-682-2980; www.tektronix.com. Circle 452 on reader service card.

THERMAL DYE
PRINTERS

Eastman Kodak Co.

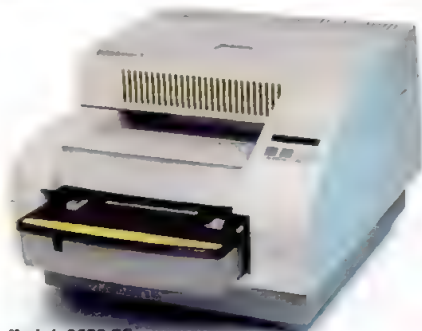
Kodak Digital Science
8650 PS

The Kodak Digital Science 8650 PS is the Lexus in this roundup—a luxury sports sedan. At \$10,795 list and roughly \$9,000 on the street, it's the most expensive letter-size thermal dye printer we saw. It's also the fastest, and it offers eye-catching output even by 300-dpi thermal dye standards. For graphic artists who need super A-size color comps that look and feel like glossy photos, the 8650 PS is a must-see.

Eastman Kodak Co. offers three grades of paper that work with the 8650 PS, so you can match the paper to the task. Photographic grade (68 cents per sheet) is meant to match photographic prints. Commercial grade (90 cents per sheet) matches the paper hue used by commercial printing presses, and publication grade (90 cents per sheet) matches the paper color for magazine stock. The paper also comes in several sizes, including a super A size that will let you print a full-bleed 8.5-by-12-inch image.

Setup is straightforward: Mount the ribbon and load the paper. Installing the software is a bit unusual, with one driver for four-color ribbons and another for three-color ribbons. You'll need to install both drivers and switch between them as needed. Note, too, that the price includes network support for LocalTalk only. For EtherTalk and TCP/IP, you need a \$995 network card.

Output is impressive. Photographic images retain all the detail and shading you would expect in a photo. Graphics are dazzling, with brilliant colors, smooth gradients, and solid thin lines. However, the



Kodak 8650 PS

Shinko ColorStreams: Two More Contenders

Shinko Technologies could not send us final production versions of its two newest thermal dye printers in time for testing. Based on what we observed of the preproduction units, though, graphic artists may want to keep these printers in mind when they make up their short lists.

The letter-size ColorStream II DP (\$7,995 list) and the tabloid-size ColorStream II DPL (\$14,995 list) are virtually identical. Designed for printing color proofs and comps in the context of heavy-duty, near-continuous network use, they are thoughtfully constructed. For example, each includes a SCSI-2 interface (in addition to parallel, serial, AppleTalk, and optional Ethernet interfaces), provision for an external SCSI drive for font storage, and an internal 540MB hard disk for queuing large print jobs. Even the tops of both printers are deliberately curved, so no one can accidentally lay anything down that could obstruct the air vents.

Setup is easy and intuitive. In addition, there are only three buttons (Menu, Select, and Reprint), and there is a 16-character LCD on the front panel. The LCD readout has limited functionality; primarily, it reports printer status and lets you select the proper interface. These printers do not use bidirectional communications, so they do not echo their status to the host PC. Both printers have a short warm-up time and do not so much turn on as boot up, just like a hard drive. The paper tray holds

50 sheets and can be adjusted for different sizes. Changing from paper to transparency media requires flicking a green lever on the side of the tray.

One quirk is the need to prep the paper tray properly before sliding it in. You must lock the pressure plate down, load the paper, and insert a finger through a hole in the tray bottom to release the spring. Otherwise, the printer will constantly report paper jams and refuse to print.

Print quality was just short of outstanding. Gradients were so seamless that we detected no banding whatsoever. Colors were rich and true to life, edges were sharp and well defined, and details were accurate even in bright highlights and dark shadows.

Both printers include Photoshop drivers, but because the ones with our units were 16-bit utilities for Windows 3.x, we did not test them. (Shinko promises that its Windows 95 Photoshop driver should ship by the time this issue appears.) Nor did we test the Agfa FotoTune color management system,

because while it comes with the printers' Mac versions, the profiles had not yet been written for the PC. Shinko ships with several color correction options; our tests showed that you can make the best photo-realistic prints with the Perceptual option and the best vector-based graphics with the Colorimetric option. Neither printer is Pantone-certified.

Shinko may be a newcomer to the U.S. printer market, but its ColorStream II DP and DPL printers show promise for quickly becoming mainstays among serious graphic arts professionals.

ColorStream II DP. List price: \$7,995. **ColorStream II DPL.** List price: \$14,995. Shinko Technologies Inc., Hayward, CA; 800-997-4465; 510-441-1175; fax, 510-441-2263; www.shinkotech.com. *Circle 451 on reader service card.*



The printers produced excellent photographic output.



Shinko ColorStream II DP

printer stumbles a bit by varying thicknesses for thin black lines that sit between blocks of solid color.

The 8650 PS's claimed speed is 0.86 ppm with the four-color ribbon, which is fast for a thermal dye printer. True to its promise, it produced the fastest results overall on our tests. Note that the 8650 PS comes with a module for printing from Photoshop in raster mode to save processing time and, theoretically, speed up printing; on our tests the printer was actually faster in Adobe PostScript mode.

If speed and quality are essential in your art department and A-size printouts are all you need, this is clearly a

printer to take seriously.—MDS

Kodak Digital Science 8650 PS. List price: \$10,795. Eastman Kodak Co., Rochester, NY; 800-235-6325, 716-724-4000; fax, 716-726-4551; www.kodak.com. *Circle 446 on reader service card.*

Fargo Electronics Inc.

Pictura 310e, PrimeraPro

Fargo Electronics has made a name for itself in the graphic arts community by offering low-cost thermal dye printers for producing color comps. This year we tested two dual-mode (thermal dye and thermal wax) Fargos: the letter-

and legal-size PrimeraPro (\$1,895 list, \$1,500 street) and the tabloid-size Pictura 310e (\$5,995 list, \$5,000 street). Both are GDI printers that can produce acceptable continuous-tone photo-realistic prints as well as three- and four-color thermal wax proofs. The units are slower and less user-friendly than the others we tested in this category, but their low prices put them within reach of those who would otherwise have to do without.

In testing, we experienced several problems that were particular to both the Pictura and the PrimeraPro. One was keeping dust off the output: We had to clean each unit's printhead more

Multi-Functional Reality

Now better,
faster & easier.

Introducing our new 600 dpi Laser Multi-Function Centers

The reality is that while our original award-winning MFCs were impressive, our new models are even better. They feature uncompromising 600 dpi laser printing and an impressive 6ppm print speed. We've even made them smarter and easier to use, with sophisticated document management technology that performs multiple operations simultaneously. They're the ideal combination of features, quality and performance. In short, the ultimate in 600 dpi laser Multi-Function Centers is finally a reality.

5 in 1

MFC 4550 Laser Multi-Function Center

Plain Paper Laser Fax
600 dpi Laser Printer
400 dpi Scanner
Laser Copier
PC Fax

Starting around \$799**

6 in 1

MFC 6550mc Laser Multi-Function Center

Plain Paper Laser Fax
600 dpi Laser Printer
600 dpi Scanner
Laser Copier
Digital Message Center
PC Fax

Starting around \$999**

FOR THE NAME OF YOUR NEAREST RETAILER, CALL TOLL-FREE 1-800-8-BROTHER

For more information, please call the Brother fax-backSM system, 1-800-521-2846

or visit our web site at <http://www.brother.com>

brother®

We're at your side.

Brother International Corporation, Somerset, NJ • Brother Industries, Ltd., Nagoya, Japan

*Awards issued for MFC-4500ML in 1995. **Actual prices may vary
CIRCLE 208 ON READER SERVICE CARD

Move To The Next Stage Of PC Power!

Intel Pentium®Pro 200MHz Processor Based Systems by BOLDdata™

Adventure Pro/200 by BOLDdata

The race to 32-bit operating systems and applications has begun, and BOLDdata has a system that will get you to the finish line. We've built a PC with the power required to handle today's demanding 32-bit applications, that's sleek enough to fit under your desk. Featuring Intel's Pentium®Pro 200MHz processor, our Adventure Pro 200 delivers the workstation level performance you need to run Windows NT, OS/2, and UNIX applications, at PC level prices that will surprise you - check out the features:

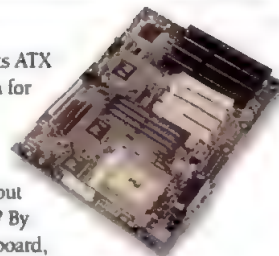
- Intel Pentium®Pro 200MHz processor w/256k L2 cache
- 32MB EDO memory
- Western Digital 2.5 MB IDE hard drive
- 230 watt power supply
- Mid-tower chassis (ATX form factor)
- TEAC 1.44 floppy
- 4 PCI - 3 ISA slots
- MITSUMI 104 keyboard

All this power for only \$1,589.⁰⁰
- that's BOLD pricing!



Intel ATX Motherboard/Form Factor

The Adventure Pro's power is complemented by its ATX form factor chassis, which features plenty of room for expansion cards and an improved ventilation system. Intel's ATX motherboard offers expandability within a mid-tower chassis, accommodating six full length add-on cards without crowding the processor and SIMM sockets. How? By incorporating standard I/O interfaces on the baseboard, including two serial ports, one parallel port, keyboard and mouse connector. To keep the 200MHz processor cool, the fan intake is located directly over the CPU and SIMM sockets, sucking cool air across them - a chassis feature designed specifically for cooling Pentium®Pro processors.



BOLDdata - Quality and Competitive Prices

Since our founding in 1984, we have succeeded by focusing on our formula for success: quality, technology, customer satisfaction, and competitive pricing. Because of our vigilant attention to these factors, we are able to bring you leading edge technology like Pentium®Pro processor based systems at competitive prices. And we don't stop at basic systems: by leveraging our product line of over 1000 peripherals and add-ons, we have the power to deliver fully configured systems ready to make your 32-bit applications FLY!

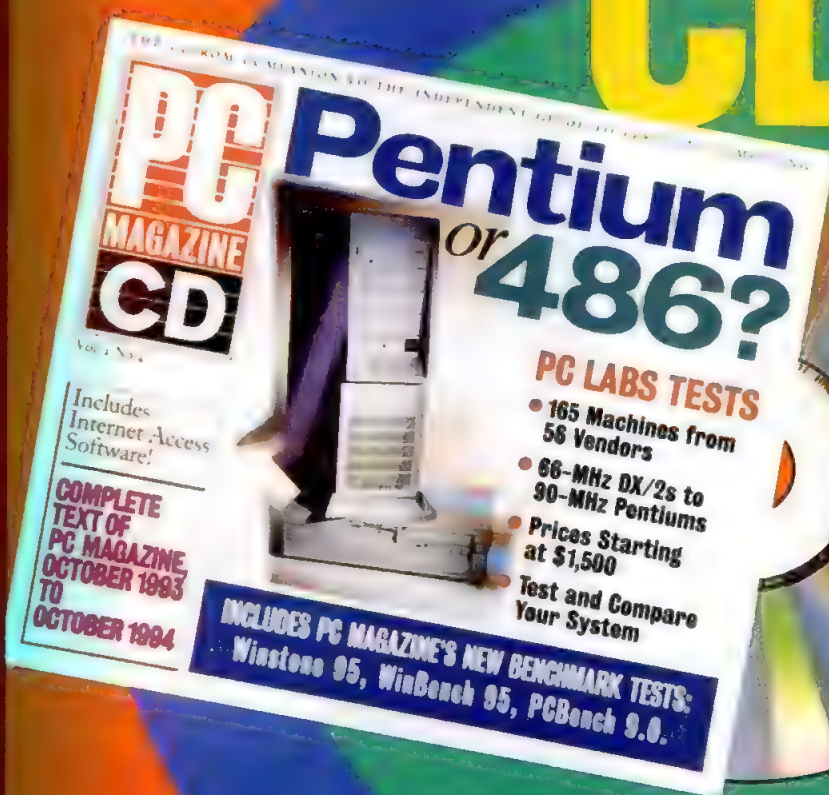


BOLDdata™
S Y S T E M S
Call 1-800-923-BOLD

INTRODUCING THE CD-ROM THAT
PUTS A WHOLE NEW SPIN ON YOUR PC:

PC MAGAZINE

CD



YOU'VE
NEVER SEEN
ANYTHING
LIKE IT!

It's one thing to read about cutting-edge technology. It's another thing to plug right into it. Interact with it. Download it onto your system and play with it. That's exactly what PC MAGAZINE CD lets you do — and more.

Just one click and this interactive companion will let you:

- Walk through multimedia ScreenDemos that bring our Cover Stories to life. Hear and see the pros and cons of the entire

competitive line-up right before your eyes.

- Put your system through its paces. Download PC Bench 9.0, WinBench 95 and Winstone 95 to chart and compare every aspect of your PC's performance.
- Get working samples of real applications to run on your system. You can even take a "First Look" at products before they hit the market.
- Access the full text of every article that appeared in PC Magazine in the past 12

months — including every utility, file, tip, shortcut and patch we've published. Dynamic "Super Searching" software lets you find what you need instantly.

PC MAGAZINE CD is a powerful tool that enhances the help you get from PC Magazine. Join us as a Charter Subscriber to PC MAGAZINE CD today.

FOUR POWER-PACKED QUARTERLY RELEASES JUST \$49.95. Save 30% off the single-disc price!

CALL TO ORDER NOW! 1-800-335-1195 SUPPLIES ARE LIMITED

Mention Priority Code: 5N6K

Toll free number is available in the United States and Canada. Other countries, call 303-804-1464 or FAX your order to 303-804-7455.
SYSTEM REQUIREMENTS: 386 or higher PC-compatible system, Windows™ 3.1, 6MB RAM, CD-ROM drive. Windows-compatible sound board recommended for some functions.
PC Magazine CD is \$72 in Canada (includes Canadian GST and shipping charges), \$99 for all other foreign orders (includes air mail charges). The U. S. single copy price of PC MAGAZINE CD is \$17.95.
PC MAGAZINE CD • P.O. Box 50404 • Boulder, CO 80322-0404

HARDWARE

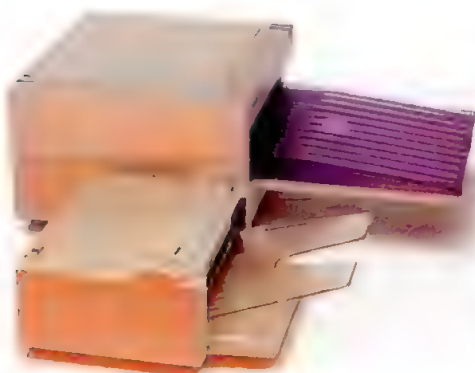
Color Printers

often than with any other printers we tested. Yet another problem was an apparent driver conflict. No matter what we did, neither printer was capable of correctly interpreting and printing the blue background on our Lotus Freehand file. And unlike most thermal dye printers, which have a sensor to warn when the ribbon has run out, the Fargo printers try to continue printing after that happens, causing expensive misfeeds. Also, Fargo customizes its color profiles to each unit, so you can install only the specific driver that ships with the printer. If the file is corrupted, you must give Fargo your printer's serial number so tech support can send you that unit's profile.

Fargo keeps down the printers' prices by shifting all the intelligence to your computer and doing away with the printer CPU. This means that your PC performs image rasterization, not the printer. Therefore, printing speed depends upon your CPU and the amount of available RAM. If you want to queue prints, Fargo recommends having at least 200MB of available hard disk space.

Prints from the Pictura exhibit excellent edge-to-edge sharpness, even on full-bleed tabloid-size sheets. We did notice slight banding on gradients and mottling of colors that should have been solid. Photo-realistic prints fared best, especially when we turned off Fargo's color management software.

Similarly, the PrimeraPro's output was good overall but not superior. For instance, we noticed some streaking and a network of tiny lines where there should have been continuous tone. As with the Pictura, photo images printed better than charts and other graphics.



Fargo Pictura 310e, PrimeraPro

On Fargo's advice, we set the PrimeraPro to print at 300-by-300 resolution rather than 600-by-300. Fargo admits that image quality improves only marginally at the higher resolution and that the longer printing time may frustrate users. Both Fargos were competitive with the more expensive thermal dye printers on our Photoshop Photo test, but they took almost an hour—four times as long—to complete our Freelance Graphics Presentation test.

The Fargos' image quality isn't in the same league as that of the other thermal dyes reviewed here—but neither are their prices. Graphic arts pros who otherwise might have to forgo a true continuous-tone color proofer might not mind the longer print times and the quirks.—*Daniel Grotta and Sally Wiener Grotta*
Pictura 310e. List price: \$5,995. **PrimeraPro.** List price: \$1,895. Fargo Electronics Inc., Eden Prairie, MN; 800-327-4622, 612-941-9470; fax, 612-941-7836; www.fargo.com. Circle 443 on reader service card.

Mitsubishi Electronics America Inc.

Mitsubishi S3600-40U, Mitsubishi S6600-40U

The Mitsubishi Electronics America thermal dye printers we tested are well-built, trouble-free devices capable of producing great-looking illustration and photo-realistic output for accurate color proofs, comps, and final artwork. The Mitsubishi S3600-40U (\$8,995 list, \$8,500 street) is letter/legal-size capable, and the Mitsubishi S6600-40U (\$14,995 list, \$12,000 street) handles sheets up to tabloid size; both printers are virtually identical in operation and image quality.

The S3600 and S6600 printers are Plug and Play devices that install automatically into Windows 95. The prices include an internal 260MB hard disk for queuing print jobs; an Ethernet adapter is a \$990 option. We felt somewhat limited by the lack of an LCD readout on the front panel; instead, both printers have a membrane control panel with a variety of status lights. Also, installing the color ribbons the first few times can be confusing. The gears must be manually inserted into the spools, and they can easily be placed so the ribbon loads upside

down. The illustrated instructions inside the printers, as well as in the ribbon boxes, are not particularly helpful; you have to read the documentation for clear, accurate directions. We did like the basic design of the adjustable paper cassette, however. Unlike other thermal



Mitsubishi S3600-40U, Mitsubishi S6600-40U

dye printers, the Mitsubishi units keep the paper inside during each color pass so it is never exposed to dust or curious fingers.

Although both printers are capable of printing 600 by 300 dpi in interpolated mode, Mitsubishi advised us that most users will not achieve a significant quality gain and may see a performance hit, so for our testing we stayed with the 300-by-300-dpi default mode. Print speed from each unit was on a par with competing units.

What impressed us most about the S3600 and S6600 was their consistently high-quality output. We were able to achieve excellent color in the default mode, and colors (especially skin tones) were rich and accurate without appearing oversaturated. The prints exhibited an excellent range of tonality: We were able to distinguish details easily in dark areas, and highlights printed without being blown out. Gradients were clean and clear, virtually free of any banding. As a plus, the S6600's driver allows the user to custom-create and select among four color profiles (such as SWOP or Pantone), which can be a real help for prepress work.

The S3600 and S6600 are no-problem workhorses designed for heavy duty professional output, whether it's for graphic arts proofs and comps or exhibition-style prints.—*DG and SWG*

Mitsubishi S3600-40U. List price: \$8,995.

Mitsubishi S6600-40U. List price: \$14,995.

Mitsubishi Electronics America Inc., Cy-

THERE'S ONLY ONE PROBLEM WITH BUYING
A PC DESIGNED FOR TODAY'S BUSINESS APPLICATIONS.
IT'S CALLED TOMORROW.



*Intel Pentium Pro Processor
up to 200 MHz*

*16 MB or 32 MB RAM
Standard*

*2 GB IDE or SCSI
hard drive*

*PCI Accelerated 2D
and 3D graphics*

Microsoft Windows NT

3 year limited warranty

INTRODUCING THE POWERMATE PROFESSIONAL SERIES WITH PENTIUM® PRO PROCESSOR.

These days, trying to buy technology for your company is like trying to shoot a moving target. If you don't set your sights far enough ahead, you'll miss. Fortunately, the NEC PowerMate® Professional is at the leading edge of the technology curve. With advanced technologies like a 200 MHz Intel Pentium Pro processor and Microsoft Windows NT®, the PowerMate Professional is just the long-term investment your company has been looking for. Power hungry 32-bit office applications, like 3D CAD/CAM and financial modeling, are not a problem for the PowerMate Professional system. And you can maintain full compatibility with all general purpose PC applications. So if you're tired of keeping up with the latest technology, we have a solution: the latest technology. For more information on the PowerMate Professional Series and other PowerMate products, just call 1-800-NEC-INFO, or visit us on the web at <http://www.nec.com>.



SEE, HEAR AND FEEL THE DIFFERENCE.™

NEC

© 1996 Packard Bell NEC, Inc. NEC and PowerMate are registered trademarks of NEC Corporation. See, Hear and Feel the Difference is a registered trademark of NEC Technologies, Inc. The Intel Inside logo and Pentium are registered trademarks and the Pentium Processor logo and the Pentium Pro Processor logo are trademarks of Intel Corporation. Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation.

CIRCLE 154 ON READER SERVICE CARD

Key #20079

www.winthis.com



press, CA; 800-843-2515, 714-220-2500; fax, 714-236-6339; www.mitsubishi-imag-ing.com. **Circle 448 on reader service card.**

Seiko Instruments USA Inc.

Seiko ColorPoint 835 PS



Like a character on a soap opera, Seiko Instruments USA's ColorPoint 835 PS (\$16,499 list, \$15,500 street) sports a dual personality, as both a thermal wax and a thermal dye printer. Aimed at the prepress market, the ColorPoint can produce full-bleed B-size desktop proofs that rival color comps from machines costing twice as much. In fact, we judged our sample photo and graphics printouts to be equal to (and in some details, superior to) output from our \$25,000 IRIS SmartJet color proofer. For no-compromises thermal dye output, the ColorPoint is the clear winner in this roundup. A super A-size version, the ColorPoint 820 PS (\$7,999 list), was not ready in time for testing but will be available by the time you read this.

The thermal wax mode in the 835 PS is for rough drafts. Seiko says that the typical graphics pro prints seven draft prints for each final print, tweaking the image after each draft. At \$1.87 for each B-size thermal wax image compared with \$9.75 each in thermal dye mode, that's a savings of about \$47 for each final image.



Seiko ColorPoint 835 PS

Despite the printer's dual personality, setting it up is straightforward: Install the ribbon, paper, and driver. You'll find built-in support for AppleTalk and TCP/IP networks; support for NetWare is notably absent, but Seiko expects to add it in 1997.

The ColorPoint's thermal dye output is among the best available. Photos show full

detail and shading. Graphics offer brilliant colors, sharp edges, and continuous-tone gradient fills. Thermal wax output is less than ideal even for thermal wax, but it's suitable for drafts to check layout and basic color schemes.

Be aware that the ColorPoint is no speed demon. Claimed engine speed is a slow 0.18 ppm, and it was among the slowest of the PostScript thermal dye printers on our tests. Also, the ColorPoint doesn't print transparencies.

All told, the ColorPoint 835 PS meets its stated mission precisely. If you need prepress proof-quality images from a desktop unit, the ColorPoint will deliver. As a bonus, its thermal wax mode will save a substantial amount of money for rough drafts.—MDS

Seiko ColorPoint 835 PS. List price: \$16,499. Seiko Instruments USA Inc., San Jose, CA; 800-888-0817, 408-922-5950; fax, 408-922-5835; www.cgg.seiko.com. **Circle 000 on reader service card.**

Tektronix Inc.

Tektronix Phaser 440, Tektronix Phaser 480X

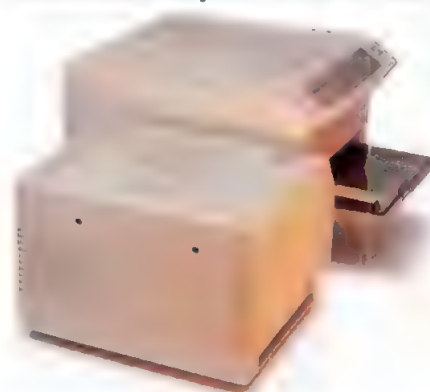
The super A-size Tektronix Phaser 440 (\$7,995 list, \$7,200 street) and super B-size Tektronix Phaser 480X (\$14,995 list, \$9,000 street) were both *PC Magazine* Editors' Choice winners in 1995, so it's no surprise that they're among the more capable printers in this year's batch. Both offer output on the high end of the scale for 300-dpi thermal dye technology, and both are appropriate for prepress work for desktop proofs. The 480X has the clear advantage for prepress work over the 440, because of its super B size and its additional color control. Both of these are very recommendable printers, though the costlier Seiko ColorPoint edges them out in overall output quality.

Installation is essentially identical for both printers. Setup involves little more than installing the ribbon, paper, and drivers. The base price for both printers includes LocalTalk support only; an Ethernet option with EtherTalk, Netware, and TCP/IP support is available.

The version of the 440 that we tested came equipped with 16MB more RAM plus the optional Ethernet card, for a list

price of \$9,785. The tested version of the 480X included 64MB additional RAM plus the optional Ethernet card, for a list price of \$19,995. According to Tektronix, the extra RAM boosts both printers' performance.

The 440 can print full-bleed A-size images with true photographic quality, with all the detail and shading of the originals. Graphic output offers brilliant colors, smooth gradients, and solid thin lines and text. The printer also does a better job than most thermal dye printers with thin lines surrounded by solid blocks of colors.



Tektronix 440, Tektronix 480X

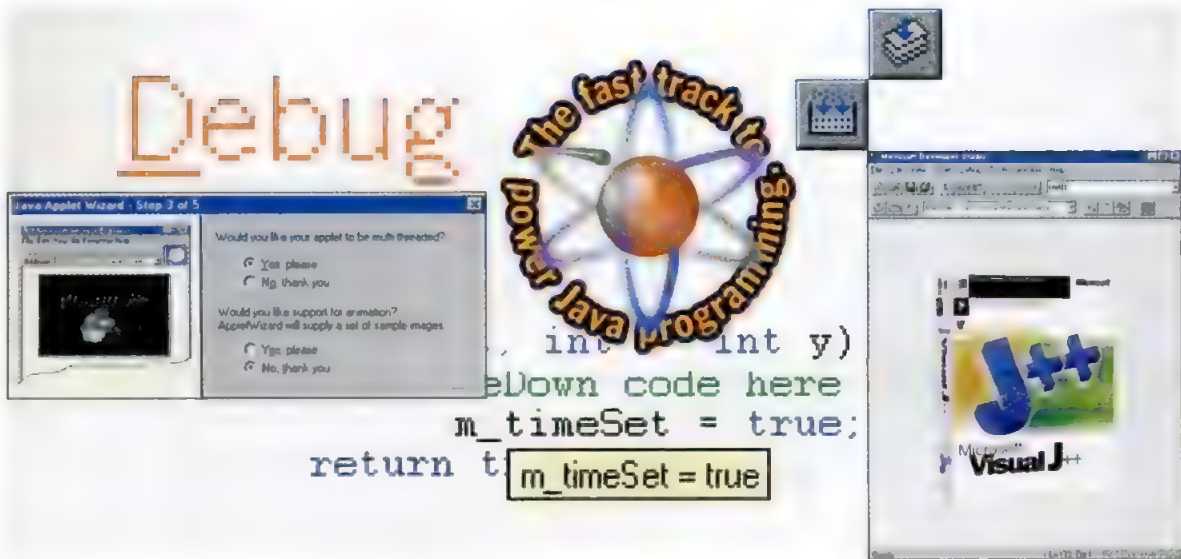
The 440's performance isn't quite in the same class as its output quality. Built around a 0.4-ppm engine, the 440 was faster than others on our Freelance Graphics Presentation test, but was on the slow side on the Photoshop Photo and Transparency Presentation tests.

The 480X is for those who need full-bleed B-size images on super B-size paper. For maximum consistency in output, it comes with easy-to-use software that lets you calibrate the printer with each new ribbon. Output quality is superb, with true photographic quality for photos and brilliant colors, smooth gradients, and solid thin lines and text for graphics. Performance is solidly midrange compared with that of other B-size printers.

Both the 440 and 480X are still very much worth considering. You can find other printers for both A-size and B-size work that offer equivalent output and faster performance, but you can also expect to pay more for them.—MDS □

Tektronix Phaser 440. List price: \$7,995. **Tektronix Phaser 480X.** List price: \$14,995. Tektronix Inc., Wilsonville, OR; 800-835-6100, 503-682-7377; fax, 503-682-2980; www.tek.com/color_printers/. **Circle 452 on reader service card.**

Microsoft Visual J++ compiles **JAVA** code at over **10,000** lines a second. Just in case you have a deadline.



While Java™ is a hot new language for creating great Internet applications, harnessing its potential can be frustrating. But now with Microsoft® Visual J++™ development software, you can take full advantage of the Java language within the proven development environment of Microsoft's Visual Tools.

Visual J++ features the **fastest Java compiler**, translating over 10,000 lines of code per second. The visual debugger includes many industrial-strength capabilities, such as simultaneously manipulating multiple applets from within your browser. Wizards provide step-by-step assistance to rapidly create sophisticated applets and ActiveX™ controls. And, everything you build will run on multiple platforms and operating systems including Apple® and UNIX.*

Visual J++ Improves Java development by making it easier.

With it, you can play a video or audio file with **just one line of code** instead of hours of coding and debugging. You can also integrate thousands of existing ActiveX controls to take advantage of desktop technologies over the Net. For data access, Visual J++ provides SQL processing using Data Access Objects (DAO) and Remote Data Objects (RDO), so you can pick the best method based on your application's requirements. And if you're familiar with the Visual C++® development system, the Visual J++ IDE should make you feel right at home.

10,000 lines of code? No problem. Be with you in just a second. To find out more about Visual J++, visit <http://www.microsoft.com/visualj/> or call (800) 621-7930, Dept. A820.*

Microsoft®

Where do you want to go today?™ www.microsoft.com/visualj/

THE POWER OF FOUR

APPLICATION SERVERS

THINK A NEW FOUR-WAY ENTERPRISE-CLASS APPLICATION SERVER WILL TAKE A \$100,000-PLUS BITE OUT OF YOUR BUDGET? THINK AGAIN. WE TEST EIGHT SURPRISINGLY AFFORDABLE QUAD-PENTIUM PRO SERVERS RUNNING WINDOWS NT SERVER 3.51. *By Bill Katz*

IN THIS REVIEW

ALR Revolution Quad6 6200/512

Ambient Airway AE-Pro

Compaq ProLiant 5000 6/200

Data General Avion AV 4900

Digital Prico 6000 Series ZX6200MP4

HP NetServer LX Pro

NEC ProServe SH

Unisys Aquanta Q5/6

Editors' Choice

Sharing the Wealth Today Clears Path

for the Future

Solutions for Managing Your Server 212

January 1996

It's pervasive: The migration away from proprietary mainframe hardware and operating systems continues unabated in corporations around the globe. Cautious IT managers seeking performance levels comparable with their beloved big iron—without sacrificing reliability—needn't look any further than the newest multiprocessor servers based on Intel's fastest CPU, the Pentium Pro.

No matter which yardstick you use—be it performance, reliability, serviceability, or man-



agement—the new generation of four-way SMP Pentium Pro systems serves it up in spades. Fueled by four 200-MHz CPUs packing 512K of on-chip L2 cache, these servers deliver power to spare. At the same time, features like hot-swappable power supplies, abundant or redundant cooling fans, voluminous hard disk expansion chassis, and massive memory support are evidence that these systems are designed for the long haul.

Staking out the high-ground application server arena—once

the exclusive domain of Unix, MVS, or VMS—can now be done at significantly lower costs. The combination of a shrink-wrapped SMP-aware OS and one of the newly minted servers we tested will allow you to deliver unparalleled computing MIPS to your hungry masses. To get the most from these servers, you'll also want to implement a high-speed backbone such as Fast Ethernet.

REVIEW CRITERIA

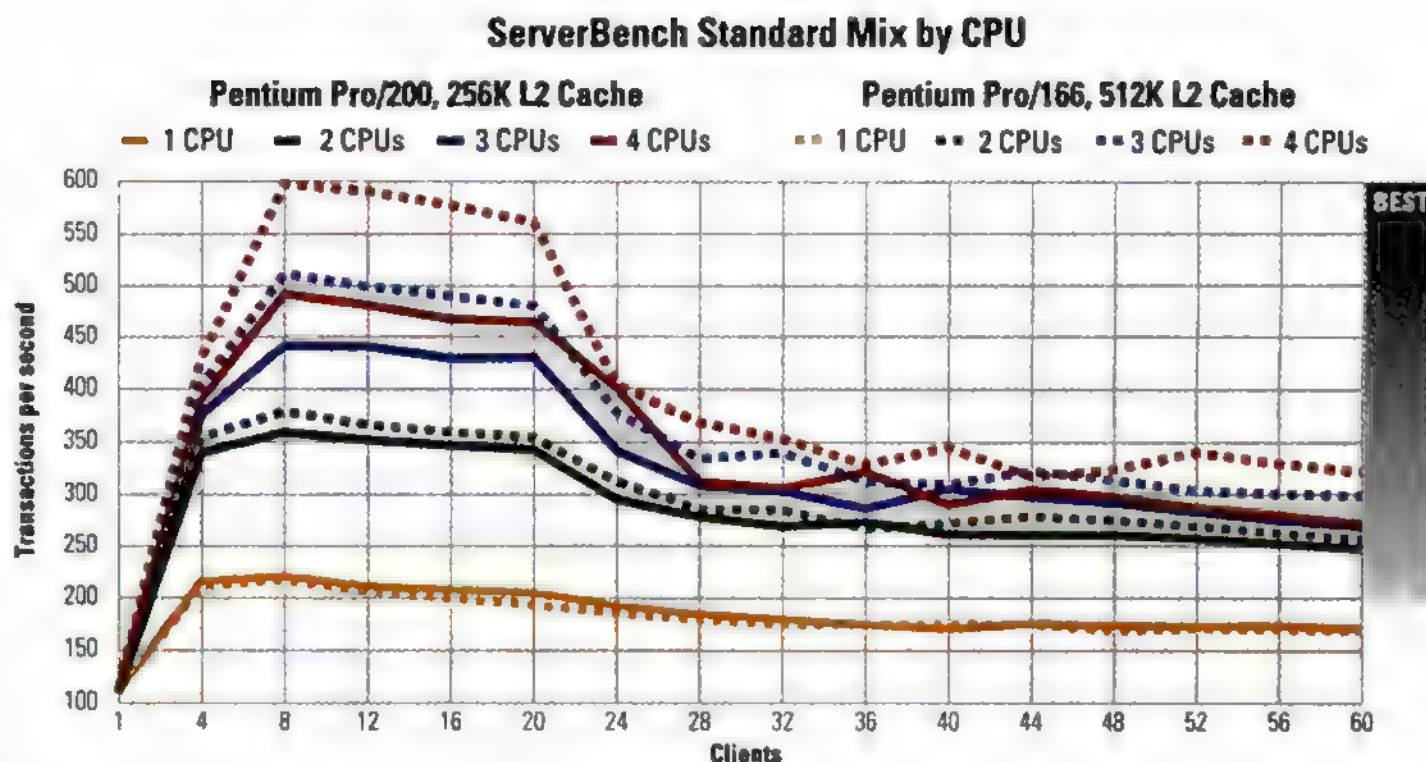
We requested each participating vendor to supply a server configuration suitable for enterprise-class performance. Specifically, we asked for four-way Pentium Pro servers with CPUs running at 166- or 200-MHz. Because of their improved performance in systems with more than two CPUs, we also recommended that Pentium Pros with the larger 512K L2 cache be supplied if available (all eight participants sent servers with 200-MHz/512K-L2 CPUs).

Two-channel hardware-assisted RAID controllers were stipulated, as was 256MB of system RAM. In order to create a level playing field, we asked our participants to supply nine 2GB drives in total, one for the operating system itself and eight for our striped (RAID 0) array.

We specified four vendor-installed 10-Mbps Ethernet adapters, though most of our participants shipped 10/100-capable hardware. We performed all our tests at 10 Mbps. We also encouraged vendors to send units containing hot-swappable or redundant power supplies, as well as any other high-availability items they deemed appropriate for a machine of this caliber. Our NOS tested environment, Windows NT Server 3.51, was to be preinstalled by the vendor (Version 4.0 was not ready in time for testing). Given the roles these server platforms are likely to play, we feel a well-designed and comprehensive management solution is de rigueur; hence we asked our participants to provide appropriate management software and hardware.

WHO'S HERE AND WHO ISN'T

We received systems for testing from Advanced Logic Research, Austin Direct, Compaq Computer Corp., Data General Corp., Digital Equipment Corp., Hewlett-Packard Co., NEC Technologies, and Unisys PC Division. Some notable absen-



tees—including IBM, NetFrame, and Tricord—either declined our request, were unable to ship in our time frame, or were in the middle of a product revision.

PCI

PCI peripherals have matured significantly over the last year, and all the servers here provide an abundance of PCI slots. This is done by incorporating two distinct PCI buses, one of which is then bridged to an EISA bus for support of older peripherals. So in these systems, you'll find at least five and even six or seven (in the ALR Revolution Quad6 6200/512, Digital Prioris 6000 Series ZX 6200MP/4, and Unisys Aquanta QS/6) PCI slots.

When using one of these dual-peer bus systems, however, deciding which slots to use for expansion cards becomes an important tuning issue. Hardware I/O devices such as network adapters or RAID controllers must be evenly distributed to achieve balanced loading within the server.

PERFORMANCE AND MANAGEMENT

We tested each server using ServerBench 3.0 with client loads ranging from 1 to 60 nodes. Four switched-Ethernet segments were used, and the test volume was a single 16GB striped (hardware RAID 0) logical partition spanning eight hard disks across two channels. We measured each unit's performance with one, two, three, and four CPUs to test the hardware's scaling ability.

Maximum application server performance depends heavily on the processor you choose. Although all of the servers here use four Pentium Pros with 512K of L2 cache, vendors are also selling four-way servers configured with the 166-

MHz/512K-L2-cache Pentium Pro, as well as with the 200-MHz/256K-cache version. But while the 166-MHz CPU makes sense in a four-way configuration, the 200-MHz/256K-cache does not.

As we were preparing this story, we were told by a few vendors that although the 200-MHz/256K-L2-cache CPU works well in a one- or two-way configuration, it does not have enough on-board cache to scale performance up to four CPUs. We put this claim to the test, and indeed, the vendors were correct. Using ServerBench, we found that both a three-way and a four-way 166-MHz/512K-L2 server can outperform a four-way 200-MHz/256K-L2-cache configuration (see the chart above). So, caveat emptor: A four-way 200-MHz/256K-cache server may be cheaper, but a four-way 166-MHz/512K-cache system will give you much more bang for your buck.

As you'll quickly discern from this story's accompanying charts, use of Intel's hottest CPU alone doesn't ensure stellar performance. From subsystem components like hard disks and their RAID controllers to seemingly innocuous network adapters, all contribute their share towards an overall solution that helps separate the leaders from the masses.

Server management is another area in which these systems tend to diverge significantly. Units from ALR, Compaq, Digital, and HP came with vendor-developed software and hardware to make real-time monitoring and control feasible. Data General supplies its own hardware management device, but like NEC and Unisys, DG relies on Intel's LANdesk Server Manager software and ISA board for most monitoring

Compaq ProLiant 5000 6/200



Our Editors' Choice in this roundup of enterprise-class application servers is the \$44,190 ProLiant 5000 6/200 from Compaq Computer Corp. This server has it all, from class-leading management and configuration software and hardware to top-notch

performance and an abundance of fault-tolerant components to ensure that your network will stay up and running.

We also award an honorable mention to the \$41,170 NetServer LX Pro from Hewlett-Packard. Among this machine's many features are a trio of hot-swappable power supplies, 12 internal hot-swappable drive bays, an incredibly easy-to-upgrade-and-service design, and cross-platform management support.

Management 101: With Compaq's SmartStart 3.0 and Insight Manager software, setting up and maintaining your server are relatively simple. Add the Remote Insight Board to the picture and you can easily manage the ProLiant from afar.

duties. ALR augments its front-panel InforManager LCD with a remote software component, and Austin's system management is still under development. See the sidebar "Solutions for Managing Your Server" for an in-depth look at each vendor's server management solution.

EVOLUTION OR REVOLUTION?

There's no doubt that the Pentium Pro's entrance into the enterprise-class application server market represents a revolution: a radical change in the underlying structure of this market. And indeed, server vendors realize this as well. In fact, two vendors here, Data General and

NEC, have eschewed their RISC-based server roots for the Intel platform (DG had previously sold only servers based on Motorola processors, while NEC had sold MIPS-based systems).

It's not just processing power that counts for this level of hardware, however: It's high-availability options, flexible management solutions, and extensive expansion capabilities that will make the difference between the real players, and those that will be left behind. And given what you'll find in the eight systems reviewed here, we think that most are up to the task.

Our Contributors: BILL KATZ is a freelance writer and founder of Hands-On Research. CHARLES LIN is a freelance writer and frequent contributor to *PC Magazine*. AMY LEUNG is a technical analyst and ANDREW GO is a support technician at PC Magazine Labs. CAROL VENEZIA was the associate editor in charge of this story, and JEFFREY G. WITT was the project leader.

Data security: Compaq's Smart-2 Array controller features a snap-on battery backup module, so if power is cut or the card fails, posted-write data is not lost.



It's covered: The ProLiant's processors, hard disks, RAM, Netelligent cards, and Smart-2 controller are all covered by a prefailure warranty. Network administrators will be notified through Insight Manager of impending failure, so new parts can be ordered before disaster strikes.

Advanced Logic Research Inc. Revolution Quad6 6200/512

The Revolution Quad6 6200/512 server from Advanced Logic Research brings system administrators ever closer to the goal of zero downtime. The four-way 200-MHz Pentium Pro server features some innovative implementations of system component monitoring and fault tolerance. At \$31,399, the Revolution Quad6 is one of the lowest-priced units in this roundup. However, it did not perform well overall: While the unit posted competitive numbers when tested with one and two CPUs, its scores with multiple processors did not stack up well against the field.

The base Revolution Quad6 system is configured with a single 200-MHz Pentium Pro CPU and 64MB of ECC RAM

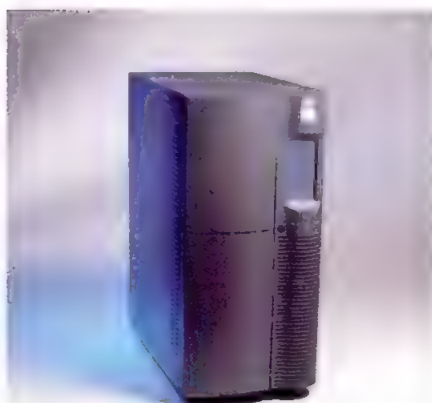
(\$12,995 with the 512K-L2-cache CPU). ALR also markets the Revolution MP line of entry-level dual-Pentium servers.

Our benchmark tests of the Revolution Quad6 placed it near the bottom of the performance curve at high client loads. In three- and four-processor configurations, the server's performance did not scale well and declined rapidly as we placed larger workloads on it.

At the heart of the system are four Intel 200-MHz Pentium Pro CPUs, each with 512K of L2 cache, directly socketed onto the unit's ALR-designed and -manufactured motherboard. Upgrading from a single to multiple CPUs requires simply inserting additional processors into the ZIF sockets and adding voltage regulator modules. The motherboard holds Intel's 450GX core-logic chip set, which supports a dual peer-to-peer PCI bus, providing a total of seven PCI slots and one shared EISA/PCI slot. Seven bridged EISA slots are also present for legacy peripherals.

Our test system came equipped with 256MB of ECC memory, which is expandable to 2GB using standard SIMMs.

For storage-hungry environments, the Revolution Quad6 provides a fault-tolerant storage solution through American Megatrends' MegaRAID Fast/Wide SCSI-2 disk controller. The AMI controller features three separate SCSI channels and includes 8MB of disk cache (expandable



ALR's Revolution Quad6 provides a vast amount of expansion space, with eight PCI slots and the potential for 15 hot-swappable drive bays.

to 128MB). Hard disks can be configured in RAID Level 0, 1, 3, 4, and 5 arrays. AMI's excellent GUI and flexible configuration utility allow the administrator to change RAID-level configurations on the fly. Our test server was equipped with nine 2GB Seagate Barracuda Fast/Wide SCSI-2 hard disks. Network support is provided by four Cogent EM110

TX Fast Ethernet adapters.

The Revolution Quad6 provides plenty of space to grow as your storage requirements increase. Its wide tower case has 11 5.25-inch drive bays and 2 3.5-inch bays. Our test machine was configured with three of ALR's Quick Hot-Swap kits. These kits use two 5.25-inch drive bays as a single module that can accommodate three 3.5-inch hard disks. Each module's backplane can be either attached as a single SCSI chain or combined with additional modules in the same chain. Like the Unisys Aquanta's, the Revolution Quad6's case has room for a maximum of five Quick Hot-Swap modules for a total of 15 front-accessible, hot-swappable hard disks.

The Quick Hot-Swap modules can be locked in place for security, and a lockable front panel protects the floppy disk and CD-ROM drives. The server's side panels are also lockable. Two auto-switching redundant power supplies each provide 575 watts of power to the server.

Server management for the Revolution Quad6 is handled by ALR's InforManager, a combination of custom hardware and software system-monitoring features. The unit's ALR-built motherboard incorporates InforManager's hardware, unlike some third-party solutions that require separate add-in devices and sensors. InforManager uses its own CPU and bus to retrieve information from various tempera-

SUITABILITY TO TASK	
ALR Revolution Quad6 6200/512	
Fault tolerance	Good
Management/configuration	Fair
Performance	Fair
Security/expandability	Good

APPLICATION SERVERS

How to Read the Suitability to Task Boxes

The **fault-tolerance** rating indicates the extent to which a server provides redundant components. We take into consideration RAID levels supported by the system's disk controller; the number of hot-swappable drive bays; the number of power supplies that are hot-swappable, redundant, or both; and the availability of prefailure warranties for hardware. Servers rated *excellent* in this category provide the components necessary to maximize system uptime.

The **management/configuration** rating represents both the quality of each vendor's server management solution and the configuration utilities provided. Systems rated *excellent* in this category provide features for asset management, network management, and fault tracking; remote alerts via pager,

SUITABILITY TO TASK	
Product name	
Fault tolerance	Poor
Management/configuration	Fair
Performance	Good
Security/expandability	Excellent

modem, and SNMP; remote reboot and configuration; and utilities for setting up and configuring the network operating system.

The **performance** rating is a measure of how well a server performed on our ServerBench 3.0 tests. Servers rated *excellent* in this category garnered high performance scores under Windows NT Server 3.51 and were able to scale performance proportionally

with one to four processors installed.

The **security/expandability** rating reflects a server's ability to be upgraded and the extent to which it provides basic security features. Principal considerations for expandability include the number of drive bays available, the maximum amount of system memory supported, the number and type of expansion slots available (with an emphasis on PCI slots), and the number of channels on the server's RAID controller. Security features rated include the presence of case key locks and BIOS-based passwords, among other features. Servers rated *excellent* in this category provide plenty of expansion space and deliver strong insurance against data and hardware tampering.

12.1" SVGA Active Matrix Display

Signature™ Adjustable Ergonomic Keyboard

Internal 6x CD-ROM Drive

SoundBlaster 16 with Built-In Mic and Stereo Speakers

Up to 10-Hour life with optional second Lithium Ion Battery

1.3/2.1 GB Removable Hard Disk Drive

Just when you thought you'd seen everything.

Samsung throws you a curve.

The new **SENS™ 810.**

SENS™ 810

PENTIUM® PROCESSOR	120 MHZ	133 MHZ	133 MHZ*
RAM	16 MB	16 MB	16 MB
HDD	1.3 GB	1.3 GB	2.1 GB
DISPLAY	12.1" SVGA Active Matrix Color	12.1" SVGA Active Matrix Color	12.1" SVGA Active Matrix Color
CD-ROM	6x CD-ROM	6x CD-ROM	6x CD-ROM
BATTERY	Lithium Ion	Lithium Ion	Lithium Ion
WARRANTY	3 year	3 year	3 year
PRICE	\$4,199	\$4,599	\$4,999
BUSINESS LEASE	\$155 per month	\$170 per month	\$184 per month

*Model comes standard with a PCMCIA 28.8 Modem/Fax card

Order today.
It's simple. Just call
1-800-656-2581.

**Full 3 Year Warranty and 1-Year
Executive Support Program.**
24-hour turnaround on repairs. Call for details. 30-Day Money Back
Guarantee. Lifetime toll-free 24-hour technical support.



SAMSUNG ELECTRONICS DIRECT



Design, prices and specifications are subject to change without notice. Photos may not represent actual product. 10% restocking fee on items returned for credit. All brand and product names are trademarks or registered trademarks of their respective companies. The SENS logo is a registered trademark of Samsung Electronics America, Inc. The Intel Inside and Intel Pentium logos are registered trademarks of the Intel Corporation. This device complies with FCC Class B, UL and CSA. Call for leasing information.

CIRCLE 033 ON READER SERVICE CARD

ture sensors, voltage sensors, and the system's BIOS. A touch-sensitive LCD panel on the front of the server's enclosure can be used to view server statistics and reset system alarms. InforManager applets for Windows NT Server and NetWare are also included for in-band system management (an out-of-band management solution is currently not available). The applets' features include a user-definable alarm with electronic mail and pager notification.

The Revolution Quad6 is a good choice if you need a server with a lot of expansion potential. Although it lacks enterprise-level management support, it would work well for smaller LANs. The unit is also available in a rack-mount configuration.—*Charles Lin*

Revolution Quad6 6200/512. Street price: \$31,399. Advanced Logic Research Inc., Irvine, CA; 800-444-4257, 714-581-6770; fax, 714-581-9240; www.alr.com. *Circle 454 on reader service card.*

Austin Direct

Affinity XEPro

Austin Direct's Affinity XEPro combines good performance and scalability, plus 12 hot-swappable drive bays. Unfortunately, the vendor's own server management solution was not available in time for testing. At \$30,120 direct from Austin, the Affinity XEPro is the lowest-priced server here. And for mission-critical applications, its built-in RAID storage and triple-redundant hot-swappable power supplies should keep this machine up and running.

Although the Affinity XEPro's performance did not top the charts, its scores on our ServerBench tests remained competitive at all four CPU levels; we also saw good performance scaling as additional CPUs were added. The Affinity performed very well on the ServerBench disk test, producing top scores with 32 clients.

Inside the Affinity's wide tower case is a four-processor system based on an American Megatrends motherboard. The AMI motherboard has two slots for processor cards and a single slot for the system's memory card. Each processor card can accommodate two Pentium Pro processors (200 MHz with 512K L2 cache in our test system—a 166-MHz configuration is also available) and an accompanying voltage regulator module. Austin includes both dual-processor cards even with its single-processor base system, so you don't have to purchase another card later on if you want to upgrade past two CPUs. The memory card was populated with 256MB of standard DRAM, unlike other systems in our roundup, all of which used ECC DRAM. The eight slots on the memory card can accommodate up to 1GB of RAM.

The AMI motherboard uses Intel's 450GX chip set, which supports dual peer-to-peer PCI buses, giving the Affin-

Price/Performance Index: Application Servers

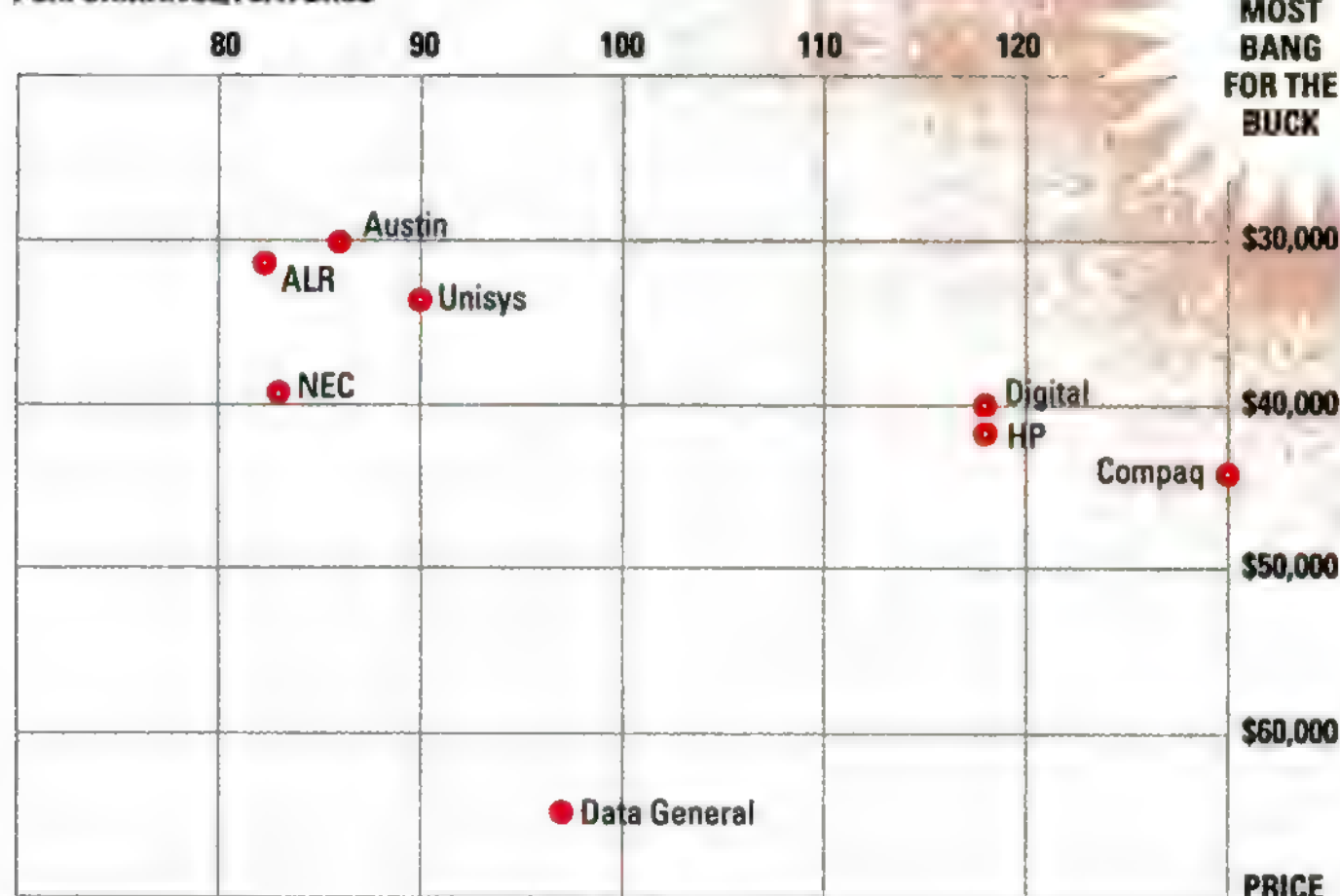
The leader on our price/performance scale is our Editors' Choice in this roundup of enterprise-class application servers, the \$44,190 ProLiant 5000 6/200 from Compaq Computer Corp. This machine not only led the pack on our ServerBench tests, it offers unparalleled configuration and server management support with its

SmartStart 3.0 and Insight Manager packages. Add Compaq's new Remote Insight Board and you don't need to be close to your server room to manage the ProLiant.

Data General's Avion AV 4900 marks the vendor's entry into the Intel-based server market, but its companion Clariion external storage subsystem

was the star of DG's show. The Clariion, with its 20 redundant, hot-swappable drive bays, six redundant cooling fans, redundant power supplies, and dual fail-over storage processors, takes PC-based storage to new heights. This level of hardware sophistication does come at a price, however: As tested, the Avion and Clariion duo cost \$64,800.

PERFORMANCE/FEATURES



THE DATA POINTS

Scores posted on our ServerBench 3.0 benchmark tests account for 40 percent of the performance/features score. System features—including the presence and number of redundant or hot-swappable power supplies, number of memory slots, number of hot-swappable drive bays available in the server, and external drive array (if included with test unit)—account for 35 percent of the performance/features score. Management and service features, including the presence of hardware/NOS setup software, standard warranty on parts and labor, and robustness of in-band and out-of-band management offerings, make up the remaining 25 percent of the score.

Dear **former**
computer company,

here is a list of my **demands:**

1. i want to buy
high performance
direct and
i want it **fast!**
2. i want a company that has
important
friends who
back them up.
3. when i call, i want to
talk to a **human being**
who knows my name.

Nothing personal,
it's just the way
to do **business** now.

multi-media



option #1

- 133MHz Pentium® Processor
- 256K pipeline burst cache
- 16MB EDO DRAM
- 1.6GB EIDE Hard Drive
- 8X CD-ROM
- 64-bit 3D video with 2MB EDO
- Real-time video capture & MPEG1 playback
- 33.6 kbps FAX modem with Simultaneous Voice over Data
- 16-bit SRS 3D wavetable audio
- Altec Lansing powered speakers
- 15" (13.7" viewable) display
- Microsoft Windows 95
- Corel WordPerfect Suite 7 and Z-MPC bundle*

lease for 36 mos **\$1949**

option #2

- 166MHz Pentium Processor
- 256K pipeline burst cache
- 16MB EDO DRAM
- 2.1GB EIDE Hard Drive
- 8X CD-ROM
- 64-bit 3D video with 2MB EDO
- Real-time video capture & MPEG1 playback
- 33.6 kbps FAX modem with Simultaneous Voice over Data
- 16-bit SRS 3D wavetable audio
- Altec Lansing powered speakers
- 15" (13.7" viewable) display
- Microsoft Windows 95
- Corel WordPerfect Suite 7 and Z-MPC bundle*

lease for 36 mos **\$2249**

option #3

- 200MHz Pentium Processor
- 256K pipeline burst cache
- 32MB EDO DRAM
- 2.1GB EIDE Hard Drive
- 8X CD-ROM
- 10mega Zip 100 drive
- 64-bit 3D video with 2MB EDO
- Real-time video capture & MPEG1 playback
- 33.6 kbps FAX modem with Simultaneous Voice over Data
- 16-bit SRS 3D wavetable audio
- Cambridge SoundWorks speakers
- 17" (15.5" viewable) display
- Microsoft Windows 95
- Corel WordPerfect Suite 7 and Z-MPC bundle*

lease for 36 mos **\$3049**

corporate



option #1

- 166MHz Pentium Processor
- 256K pipeline burst cache
- Intel 430MX PCiset
- Intel PIIX3 PCI - IDE Xcellerator
- 16MB EDO DRAM
- 1.6GB EIDE Hard Drive
- 8X CD-ROM
- 64-bit video with 2MB SGDRAM
- 15" (13.7" viewable) display
- Plug-N-Play flash BIOS
- Remotely manageable through DMI
- Microsoft Windows 95
- Microsoft Office Professional
- Three Year Limited Warranty

lease for 36 mos **\$2099**

option #2

- 200MHz Pentium Processor
- 512K pipeline burst cache
- Intel 430MX PCiset
- Intel PIIX3 PCI - IDE Xcellerator
- 32MB EDO DRAM
- 2.5GB EIDE Hard Drive
- 8X CD-ROM
- 64-bit video with 2MB SGDRAM
- 17" (15.5" viewable) display
- Plug-N-Play flash BIOS
- Remotely manageable through DMI
- Microsoft Windows 95
- Microsoft Office Professional
- Three Year Limited Warranty

lease for 36 mos **\$2699**



ZENITH
DATA SYSTEMS

*The Z-MPC bundle includes Corel WordPerfect Suite 7, Corel Quattro Pro 7, Corel WordPerfect, Microsoft Works, MS Money, MS Publisher, Janna Contact Lite, America On-Line, Netscape Navigator, MS Encarta 1996, Best of Microsoft, Entertainment Pack, Super Doodle Fun, Scientific Artistic Utilities and Office Materials

portables



Z-star 90

- 100MHz Pentium Processor
- 256K pipeline burst cache
- 10.4" Active Matrix 800x600 screen
- 8MB DRAM, expandable to 40MB
- 810MB EIDE Hard Drive
- NiMH battery
- 16-bit sound w/integrated speakers
- Infrared IrDA port
- 2 Type II PC Card slots
- Trackpad
- 5.9 lbs.

lease for 36 mos **\$2599**

Z-star 9x

- 133MHz Pentium Processor
- Intel 430 MX Mobile PCiset
- 256K pipeline burst cache
- 12.1" Active Matrix 800x600 screen
- 128-bit graphics accelerator w/1MB
- 16MB DRAM, expandable to 40MB
- 1.3GB EIDE Removable Hard Drive
- 6X CD-ROM module
- Lithium Ion Smart battery
- 16-bit sound w/integrated speakers
- Infrared IrDA port
- 2 Type II PC Card slots
- 6.9 lbs.

lease for 36 mos **\$3999**

Z-note 6000

- 133MHz Pentium Processor
- Intel 430MX Mobile PCiset
- 256K pipeline burst cache
- 12.1" super-bright TFT screen
- 800x600x16bpp resolution
- 70Hz refresh
- 64-bit graphics accelerator w/2MB
- 16MB DRAM, expandable to 40MB
- 1.3GB EIDE Removable Hard Drive
- 6X CD-ROM module
- Lithium Ion Smart battery
- 16-bit sound w/integrated speakers
- Robust docking strategy
- 2 Type II Cardbus slots
- 28.8 kbps data/FAX modem
- 6.9 lbs.

lease for 36 mos **\$4999**

Call **800.554.6741** today to speak with a ZDS direct sales consultant. <http://www.zdsdirect.com>
Education/state and local government customers call: **800.554.8892**

on second thought,
i think
i'll just call
**Zenith Data
Systems**
direct...

Introducing the new direct Zenith Data Systems.
The way to do business now.

For business computing customers, it's all coming together in one company. • High Performance hardware for your most demanding desktop, notebook and server applications, for individuals, workgroups and organizations. High-performance that saves you time and maximizes your investment. • Custom-Configuration to assemble precisely the machines you need, precisely when you need them. Because nobody knows better than you how you want your hardware to work. • Outstanding Technical Support because minimizing downtime is always a mission-critical function. • And Strategic Alliances with industry leaders who have the strength to offer you cutting-edge technology and the stability to support you in the years to come. • No other company offers greater computing value than ZDS.

Zenith Data Systems... direct.
The way to do business now.

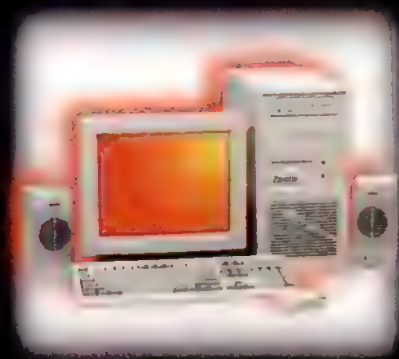
ZENITH
DATA SYSTEMS
DI RECT

Turn the page for even more outstanding high performance values...

professional

servers

build-to-order



option #1

- 180 MHz Pentium Pro Processor
- 256K pipeline burst cache
- Intel 440FX PCiset
- Intel PIIX3 PCI to IDE Xcellerator
- 16MB EDO DRAM
- 2.5GB EIDE Hard Drive
- 8X EIDE CD-ROM
- 128-bit video with 2MB MDRAM
- 17" (15.5" viewable) Display
- Plug-N-Play flash BIOS
- Remotely manageable through DMI
- Microsoft Windows 95 or Microsoft Windows NT Workstation
- Microsoft Office Professional

lease for \$100/mo **\$2749**

option #2

- 200 MHz Pentium Pro Processor
- 256K pipeline burst cache
- Intel 440FX PCiset
- Intel PIIX3 PCI to IDE Xcellerator
- 64MB EDO DRAM
- 3.1GB EIDE Hard Drive
- 8X EIDE CD-ROM
- 128-bit video with 2MB MDRAM
- 17" (15.5" viewable) Display
- Plug-N-Play flash BIOS
- Remotely manageable through DMI
- Microsoft Windows 95 or Microsoft Windows NT Workstation
- Microsoft Office Professional

lease for \$110/mo **\$3349**



2-server w/

No two networks are the same. Your servers should fit your needs, not the other way around. Call us, and we'll custom configure a cost effective Z-Server W/.

- 120 or 150 MHz Pentium Processors
- Upgradable to 2-way SMP
- 256K or 512K pipeline burst cache
- 16MB to 256MB of ECC DRAM
- Two SCSI channels:
 - Fast SCSI-II for peripherals
 - PCI Ultra Wide SCSI-III for primary storage
- 1 to 4 Ultra Wide SCSI Hard Drives, 1 or 2GB each
- 5 EISA, 2 PCI, and one shared EISA/PCI slots
- 8-bay vertical chassis with 300W of power.
- 4X SCSI CD-ROM
- Integrated PCI video controller
- Certified for Novell, Microsoft, and Banyan network operating systems

starting at \$3899

Z-server MX

The power and endurance to drive your enterprise. Call us, and we'll custom configure a powerful Z-Server MX to fit your information strategy.

- 100, 133 or 166 MHz Pentium Processors
- Upgradable to 2-, 3-, or 4-way SMP
- 1MB of L2 cache per CPU module
- 16MB to 768MB of ECC DRAM
- Two PCI Fast-Wide SCSI-2 controllers
- 11-bay vertical chassis with 525W of power.
- 6 "Hot Plug" Hard Drive bays
- 1 to 6 "Hot Plug" SCSI-2 Hard Drives, 1GB, 2GB, or 4GB each
- 4X SCSI CD-ROM
- Integrated video controller
- Certified for Novell, Microsoft, and Banyan network operating systems

starting at \$9399

call for lease prices

popular upgrades and accessories

desktops:

- 3Com PCI Ethernet card **\$119.00**
- 33.6 kbps FAX modem **\$129.00**
- 3.2GB Travan tape Backup **\$249.00**
- CD-R recordable CD drive kit **\$949.00**
- Paperport personal scanner **\$299.00**
- Upgrade to 3 years On-Site Service **\$179.00**

notebooks:

- 28.8 kbps FAX modem **\$129.00**
- 3Com Ethernet card **\$119.00**
- Port Replicator **\$119.00**
- 16MB memory module **\$399.00**
- Deluxe carry bag **\$59.00**
- HP Deskjet 340 **\$199.00**

Although ZDS prides itself on providing a wide-range of configurations, we realize some customers have more specialized needs. That's why if you don't see what you need, we'll work with you to custom-build your dream machine from the ground up. Our sales consultants will help you choose from the most powerful components available today. The goal is a machine that's perfectly suited for your needs.

ZENITH
DATA SYSTEMS

DIRECT

Specifications and prices subject to change without notice. All marks are property of their respective organizations. On-site service may not be available in some remote locations. Call for details of warranty and service agreements. Lease prices are based on a term of 36 months.

Call **800.554.6741** today to speak with a ZDS direct sales consultant. <http://www.zdsdirect.com>
Education/state and local government customers call: **800.554.8892**

Sharing the Wealth Today Clears Path for the Future

By Bill Katz

In the past, it was often common practice to replace server hardware with newer, higher-performing systems every few years. Upgrading an existing system just didn't buy you much in terms of real throughput gains. Replacing a CPU with a faster version usually uncovered performance-sapping bottlenecks in the disk or other I/O subsystem.

But as the newer system designs get more robust, and more costly, the need to extract every last ounce of value within them becomes paramount. Having a clear growth path for future expansion—be it disk storage, RAM, or CPUs—means it'll take that much longer before you relegate these servers to second-class status.

NO TIME FOR DOWNTIME

Server vendors are currently taking a few different approaches to sharing system resources. Digital Equipment Corp.'s sharing solution is called Digital Clusters for Windows NT, an add-on software component that allows two Windows NT 3.51 servers to share a common SCSI bus and hard disks (support for a Windows NT 4.0 version will be forthcoming). If either server fails, its partner can assume control of the SCSI chain and provide disk-based services to users. A client-side component allows browsing of cluster resources from Windows 3.x, Windows 95, or Windows NT nodes. When combined with a DBMS that is cluster-aware, such as Microsoft SQLServer 6.5, clustering as a means to achieve fault tolerance can help the IS director sleep easier. But these solutions do little to address scalability issues.

For its part, Compaq Computer Corp. offers Standby Recovery Server and On-Line Recovery Server. Both use a common SCSI bus linking the

two servers as well, but Standby Recovery Server is the less sophisticated of the two and requires users to log on to the backup server after it takes over. On-Line Recovery Server does switch over user connections automatically, but there are some differences in the two solutions. First, Standby Recovery Server requires identically configured hardware, since a single disk image is used for both servers. Also, the secondary server cannot be used for any other duties while it's in standby mode.



For fault-tolerant network connections for its ProLiant 5000 6/200 servers, Compaq offers its new Netelligent network adapters. The system works by attaching separate NICs to the same network segment, which the NIC monitors for loss of connection. If this occurs, traffic is directed to the auxiliary NIC.

Data General applies significant resources to maintain high availability in its Clariion disk array. The unit can house two completely separate SCSI processors, mirrored cache, a battery backup, and redundant power. Most of these components are also hot-swappable. When connected to individual SCSI host adapters, this approach eliminates most single points of failure in the disk channel. The Clariion's SCSI processors can be configured to take over for each other in the event that one fails.

Software vendor Octopus Technologies offers a one-to-many form of protection for Windows NT servers that mirrors disk transactions to another server's volumes. With its Automated Switch Over (ASO) option, a lost server can have its backup server assume the identity of the failed machine and take over client requests. A Super ASO option designed to work with Windows

NT Server 4.0 will extend the software's ability by allowing the switchover to happen in real time.

Using a one-to-one approach, Vinca Corp.'s StandbyServer for Windows NT takes advantage of the native disk-mirroring abilities of the NOS. It operates by extending the logical disk channel over a high-speed interconnect to a second server. If the primary server should fail, the secondary server already contains the mirrored image of its data. Once the secondary server assumes the identity of the failed server, all connected users will quickly regain access, with only minimal disruption of services.

WHAT LIES AHEAD

For the future, several new server-clustering technologies will go even further towards staving off obsolescence by enhancing performance and scalability. Using the Intel Standard High-Volume motherboard as a building block, high-end server vendors such as Sequent, Data General, and others are developing hardware to link many of these four-way nodes together. Using a design called *ccNUMA* (Cache Coherent Non-Uniform Memory Access), this architecture revolves around a high-speed interconnect. Currently the 1-GBps ANSI standard technology known as SCI (Scalable Coherent Interface) is being used for this purpose.

Avoiding the pitfalls of massively parallel devices, systems based on *ccNUMA* should be more cost-effective and less difficult to implement. But before you'll be able to tie together 10 or 20 individual servers into a mega-processing behemoth, operating systems will need to evolve to capitalize on these designs. Intelligent scheduling of processes to use local CPUs and an awareness of the relatively slow times associated with remote memory access are just two of the factors that must be dealt with. While it's possible

Continues



Continued

to fool an OS into thinking that it's running as a single shared-memory system, full realization of ccNUMA's potential will take place only when the OS makes intelligent choices that leverage the cluster while minimizing the impact of its overhead.

Tandem Computers has its own design for clustering. Known as *ServerNet*, this architecture uses unidirectional links running at 50 MBps. With paired cables, full-duplex operations over distances of up to 30 meters are possible. Systems are interconnected via a six-port router operating as a nonblocking crossbar switch. It's possible that Compaq's future clustering platforms will be based on the Tandem approach.

Still another form of clustering at a higher level is that being discussed by Microsoft. Code-named *WolfPack*, this is a set of APIs being developed to turn Windows NT Server and the Back Office suite of applications into a clustering platform. Microsoft has stated that a two-node variant that addresses fail-over fault tolerance will be the first to arrive, but future versions will indeed be used to extend the performance characteristics of Windows NT. Taking the *shared-nothing* approach (in which no hardware is shared), Microsoft's clustering will most likely require more changes to the applications that run on it than the ccNUMA approach.

There is also a move afoot to bring a different type of scalability to both hardware and software. Known as *I₂O*, for *Intelligent I/O*, this initiative is being spearheaded by Intel, Compaq, Hewlett-Packard, Novell, Symbios Logic, 3Com, Microsoft, and NetFrame. *I₂O* was designed to create a standardized I/O subsystem that is both OS- and hardware-independent. This is done by creating a layered messaging architecture for I/O control functions. The *I₂O* revision

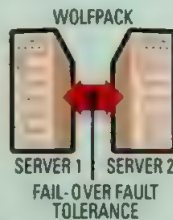
1.0 spec was ratified in March, and work is underway on a planned 1.5 Revision that will incorporate peer-to-peer communications of I/O devices. Revision 2.0 is likely to include clustering and WAN features.

Looking more near-term, expect to see SCSI alternatives like Fibre Channel or SSA make their market debut in 1997. Despite being based on serial protocols, these technologies are faster than SCSI, can handle more than 100 devices on a single chain, have built-in fault tolerance and automated configuration, and can extend for greater distances than even Differential SCSI.

WEB-BASED MANAGEMENT

Not left out of this rush towards the future, systems management is also poised to take a major new turn for the better. A consortium led by BMC Software, Cisco Systems, Compaq, Intel, and Microsoft has put forth a proposal based on existing Web-based protocols like HTTP.

Doing away with proprietary SNMP management consoles, the HyperMedia Management Protocol (HMMP) will be designed to allow any Web browser to interrogate, monitor, and control devices such as servers, routers, or desktop PCs. To be built around an extensible, object-oriented model known as the HyperMedia Management Schema (HMMS), the promising architecture will allow existing SNMP- or DMI-managed devices to be represented as well. This will be accomplished via a third component, known as the HyperMedia Object Manager (HMOM). HTTP requests sent from the browser will be interpreted by the HMOM and sent to the appropriate native protocol for the device. If this initiative comes to fruition, it will level the management console playing field as never before. Freeing software engineers from the task of supporting countless hardware devices, Web-based management will no doubt lower costs while raising functionality to new heights.



ity five PCI slots, three bridged EISA slots, and a single PCI/EISA shared slot. Four Cogent EM110 TX Fast Ethernet adapters occupy most of the PCI slots in our test system. The system also includes an Ultra SCSI AMI MegaRAID controller with three SCSI channels and 8MB of cache. RAID Levels 0, 1, 3, 4, and 5 are supported. The machine's disk subsystem uses Seagate Ultra SCSI hard disks.

The system's wide tower enclosure showcases some unique features. Its triple 300-watt hot-swappable power blocks are side-mounted in the system. A lockable hatch on the side panel allows technicians to replace a failed power supply without



Austin's Affinity lacks a mature management solution but may work well for small LANs.

shutting down or even opening the system. The Affinity's power switch, floppy disk and CD-ROM drives, and three 5.25-inch drive bays are concealed behind a lockable panel. A separate lockable cover protects 12 3.5-inch hot-swappable drive bays that use two separate backplanes, each with its own SCSI channel. The enclosure is cooled by a large fan at the rear of the case, two midsize fans that push air across the processor cards, and a tiny fan to pull the air out.

Management of the server's vital signs is an important part of providing a zero-downtime system. By our deadline, Austin

SUITABILITY TO TASK

Austin Affinity XEPro

Fault tolerance	Good
Management/configuration	N/A
Performance	Good
Security/expandability	Good

N/A—Not applicable. The product does not have this feature.

Born leader.

3M launches
a new world leader in
Data Storage.
Imation.

Now the data storage leadership you've trusted from 3M comes from a new company: Imation. We're the same people who are the brand leaders in 3.5" diskettes and quarter-inch cartridges. And we make over half the world's 1/2" tape cartridges. Now, as a brand new \$2.25 billion Fortune 500 company, we have a new focus on understanding your needs and meeting them. With big solutions like the Travan™ minicartridge. And LS-120 technology, the new standard in high capacity diskettes. Expect a new generation of data storage leadership from Imation. Because Imation thinks the way you do. See us at <http://www.imation.com> or call 1-888-466-3456.

CIRCLE 127 ON READER SERVICE CARD



IMATION

Borne of **3M** Innovation

HOW WILL THE LAUNCH OF MID-RANGE COMPUTING? LET'S JUST

The Compaq ProLiant 5000 has arrived. And it's going to change everything that lies in its path. Including how you think about mid-range computing.

The ProLiant 5000, with its Pentium® Pro processor, delivers unprecedented performance for mid-range solutions.

But that's just the first half of the story.

In today's client/server environment, you need

more than power—you need control. So we've combined the Pentium Pro processor with a concept we're calling Integration Management. Giving you new tools to manage your system throughout its entire life cycle.

Improvements to SmartStart now let you set up an Integration Server, which basically serves as a holding tank for all your software. It also simplifies the setup and maintenance of your network. All you have to do is configure your Integration Server and then, using SmartStart, deploy it across your entire network. It not only ensures consistency across

all your network servers, it saves you a lot more than just shoe leather.

Maintaining your network is easier now, too. Thanks to some cool new features on

Compaq Insight Manager, you can get updates and new software revisions via the Internet, your modem or CD. And then

transfer them to the Integration Server just one time. You can even maintain your network

when you're away from the office. All you need is your notebook and a phone line.

We've also partnered with the industry-leading companies of system management applications. So now you can view your entire network in one place. Together, these and other improvements have helped reshape the landscape of mid-range computing, by creating the most manageable server in the industry. To find out more about the ProLiant 5000, visit our Web site at www.compaq.com, or call us at 1-800-315-7772. It's not just a server. It's a force to be reckoned with.

System	TPC-C	% per TPC-C
ProLiant 5000 6/166 M2	\$676.93	\$135
HP 9000 Server T500	\$621.00	\$380 ¹
WorkMark 5100S	\$607.00	\$394
SPARC center 2000E	\$124.21	\$323
HP 9000 Model K420	\$939.11	\$232
IBM RS/6000 J30	\$631	\$289

*A lot of companies claim to offer the lowest cost of ownership. But we have the benchmarks to prove it.**



© 1996 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office ProLiant, SmartStart, and Insight Manager are registered trademarks of Compaq Computer Corporation. The Intel Inside Logo and Pentium are registered trademarks and the Pentium Processor Logo and the Pentium Pro Processor Logo are trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. *Published TPC-C results as of 6/96. The TPC-C test is a transaction-oriented OLTP environment. *Results withdrawn as of 4/17/96. In Canada, we can be reached at 1-800-567-1616.

THE PROLIANT 5000 AFFECT
SAY ITS CODE NAME WAS "HURRICANE."



Introducing the ProLiant 5000.

COMPAQ

Has It Changed Your Life Yet?

Solutions for Managing Your Server

By Bill Katz

Just as servers have continued to grow in maturity and complexity, so too have their management suites evolved. And when you're buying servers of the caliber we tested, the ability to monitor both performance and operational status is a necessity. With downtime costs measured in thousands or even tens of thousands of dollars per hour, preventive management is the only way to go.

Server vendors take differing approaches to configuring their hardware; their paths are similarly divergent when it comes to management software. What we saw in this roundup ran the gamut from Austin Direct's work-in-progress, unreleased solution (see the review for details) to home-grown apps from ALR, Compaq, Digital, and HP to third-party solutions from Data General, NEC, and Unisys. A description of each follows.

COMPAQ'S INSIGHT MANAGER

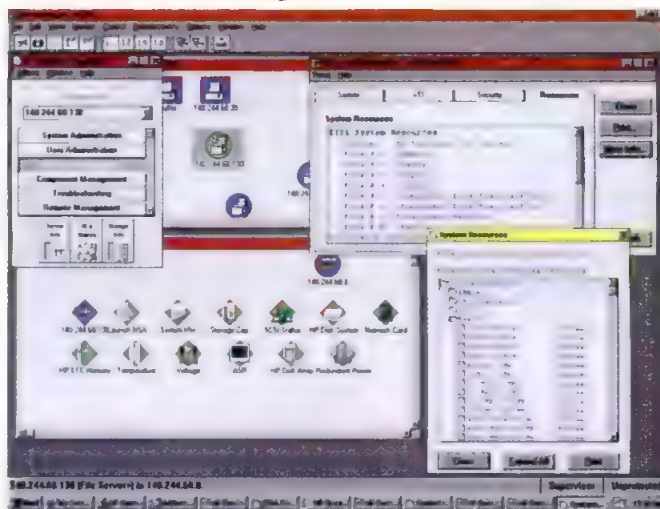
As befitting Compaq's leadership in the PC server market, its Insight Manager software remains at the forefront, with a level of functionality and a depth of information that cause it to eclipse many other packages. Insight Manager's console runs only on Windows NT, however, a fact that smaller businesses may find troublesome.

In large part, Insight Manager's abilities stem from Compaq's superlative job of designing and instrumenting its server's hardware. We could monitor utilization even on the individual PCI buses, a feat none of the other packages allowed. This can be especially important with the dual-peer PCI architecture employed by all of our test machines. By removing the guesswork, this information enables intelligent distribution of the server's I/O loading.

With a right mouse click, you can have Insight Manager graph nearly any piece of information it tracks, from packet statistics to CPU use; you set alarms in the same way. Pager notifica-

tion options are flexible. Another powerful innovation is Insight Manager's version control database, which let us determine in minutes whether server firmware, the BIOS, or software drivers might need updating.

Compaq's optional \$999 Remote Insight Board augments Insight Manager's powers. By installing this EISA card in a Compaq server, you can accomplish out-of-band monitoring and control of far-off servers (for example, in remote branch offices) via a dial-up connection. The board contains its own CPU and battery backup and can initiate paging alerts in the case of environmental or catastrophic hardware failure. It also supports full out-of-band SNMP management.



HP's NetServer Assistant, implemented in conjunction with OpenView, provides an effective means of monitoring WAN environments.

Unlike similar offerings from Digital, HP, or Intel, the Remote Insight Board supports PPP connections from the Insight Manager console for periodic gathering of server statistics. It also captures and stores the server's last two boot sequences and failure sequences for playback—helpful when you want to know why a server died. Unfortunately, dialing in via an ASCII terminal doesn't yield nearly as much information as with HP's Remote Assistant board.

A disadvantage of Insight Manager is its proprietary interface: It works only on Compaq servers. You can integrate Compaq's management information bases (MIBs) into other SNMP consoles, such as OpenView's enterprise-wide management scheme, but this yields much less functionality.

HP'S NETSERVER ASSISTANT

Hot on the heels of Compaq in many respects is Hewlett-Packard. The company's HP NetServer LX Pro compares well with the ProLiant 5000, and NetServer Assistant, bundled with it, is slightly more flexible—albeit less thorough—than Insight Manager. Based on HP's OpenView SNMP console, NetServer Assistant inte-

grates well with the near-ubiquitous management platform. Once an HP server running NetServer Assistant is discovered, a simple menu selection generates a submap containing icons for all objects the server can monitor. Launching NetServer Assistant from our network

map, we could easily peruse system resource assignments and hard disk information. But the program could display only basic drive geometry, such as the number of sectors, heads, and cylinders, in sharp contrast to the more informative Insight Manager.

To get the most from NetServer Assistant, you must add a Remote Assistant card to the server. A \$1,016 EISA-based device similar to Compaq's Remote Insight Board, HP's

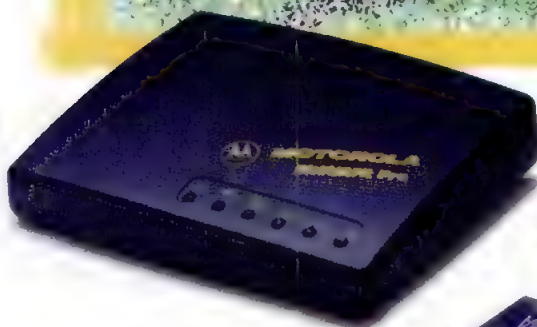
Continues

GET WIRED! GET SURFING...

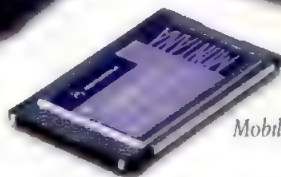
GET A MOTOROLA MODEM!

**NEW
LOWER
PRICES!**

BitSURFR Pro[™]
ISDN Modem



ModemSURFR[™]
28.8 Modem



MobileSURFR[™] PCMCIA

Our reputation precedes us. Motorola is the leader in accessing the world through cellular and paging technology. Now you can connect Motorola's reputation for quality and reliability to your computer — and the world. Whether you're accessing e-mail from your living room, telecommuting to your

office or simply surfing the Web, you need a fast, reliable connection, like Motorola's ModemSURFR, our new 28.8 Kbps VoiceSURFR[™], or our fast ISDN BitSURFR Pro with speeds up to 128 Kbps. Our technology carries Motorola's 5 year warranty and the name that goes hand-in-hand with

communications. Motorola has a full line of modems to get you connected, from wherever you are to wherever you want to be.

For more information on Motorola modems call 1-800 4A-MODEM, or at:
<http://www.mot.com/modems>

<http://www.mot.com/modems>



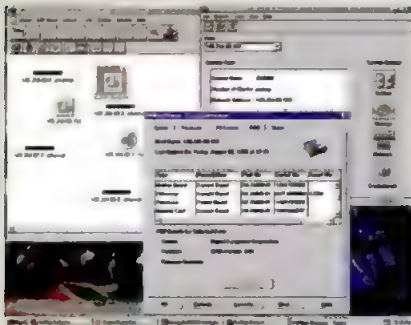
MOTOROLA

What you never thought possible.™

Continued

Remote Assistant also gathers information about the server, such as thermal data. HP bundles a copy of Symantec's pcAnywhere32 7.5, so that users running Windows NT Server can take control of the server while it's operating.

Dialing into Remote Assistant via an ASCII terminal, we could obtain operational data such as power supply voltage, temperature, and bus use. The



With Digital's ServerWorks, you can manage any SNMP device on your LAN.

latter item turned out to be EISA-only statistics, of dubious value compared with the PCI information we were seeking. NetServer Assistant's alarm settings are plentiful and straightforward, and paging options are similarly complete. Curiously, you can't obtain actual temperature or voltage readouts from the in-band NetServer Assistant console, only through the MIB or Remote Assistant's dial-in text screen.

DIGITAL'S SERVERWORKS

Differing from both Compaq's Insight Manager, with its highly specialized interface, and HP's ample OpenView-based NetServer Assistant, Digital's ServerWorks and ManageWorks (which will be fully integrated into ServerWorks by the time you read this) work in concert and offer a wide variety of tools. ManageWorks is the underlying engine, allowing you to map and browse SNMP devices. Depending on the networked environment, it can also depict LAN Manager and NetWare users and groups and shared items such as printers. ServerWorks, designed primarily as a workgroup management platform, adds the tools

necessary to inspect and report on Digital Prioris or AlphaServer systems. A third, separate component, ClientWorks (which comes standard on all Digital desktops and mobile products), adds a DMI browser for discerning data from nodes running a compatible DMI agent.

All of Digital's management applications—with one notable exception to which we'll return—are 16-bit Windows programs that can handle smaller networks quite well running on a Windows 3.x PC. For large-scale sites, ServerWorks can act as a middle-level manager, passing alerts to a Digital PolyCenter NetView console. ServerWorks' MIB Profiler and MIB Enroller also distinguish it by giving you finer control than simpler MIB compilers such as OpenView's.

Accurately depicting our network segments was a snap with ManageWorks' auto-discovery and auto-topology features. Clicking on our Prioris 6000 server produced a ServerWorks icon on our toolbar, from which we could interrogate our system. For certain categories, such as temperature or power readings, ServerWorks surpassed HP's NetServer Assistant. But we could glean only the most basic data from our hard disks. You can also look at CPU use but not bus usage.

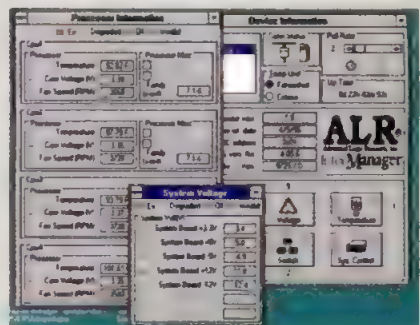
For remote administration, Digital sells the \$495 Remote Server Manager card. This EISA card was the only one tested that you can connect to a power source separate from the server. Unfortunately, though it can perform file transfers to and from the server, like HP's and Compaq's boards, the application for accessing it can run only from a system using Windows NT.

INTEL'S LANDESK SERVER MANAGER

Three vendors (Data General, NEC, and Unisys) sent systems using Intel's LANdesk Server Manager hardware and software. The 8086-based Server Manager Module (SMM) ISA card adds temperature and voltage sensing, as well as paging via an on-board PC Card modem. The companion console software, which can run locally or remotely,

adds the monitoring, alerting, and graphing of numerous Windows NT parameters. Even better, the Workgroup Manager Event Forwarder included in Server Manager lets you create SNMP trap messages for any process or application that places its messages in the Windows NT Event Log.

Data General augments LANdesk Server Manager with two other features. NTAAlert, a DG program, monitors the server for hardware and software faults. The optional Alert Module card, part of a special service plan offered by Data General, automatically transmits fault information



ALR's InforManager tracks CPU temperature, voltage, and fan speed.

to DG's customer-support office in Atlanta. The system can also disable a bad CPU or memory module and return the server to operation in degraded mode, then report to DG.

ALR AND UNISYS

ALR's Revolution Quad6 and its Unisys cousin have a front-mounted LCD panel that shows hardware status, temperature and voltage problems, fan information, and more. ALR also supplies a software package for remote or local status checking, which uses a Windows NT device driver to communicate with the Revolution Quad6 hardware. You can configure it to send alerts via pager, e-mail, or Windows NT's messenger service; you can view the information on remote Windows 95 or Windows NT consoles. By the time you read this, a LANdesk card should be available as an option for out-of-band management. Without it, the paging feature will not operate if Windows NT stalls.

had not completed its C.A.S.E. (Complete Affinity Server Enclosure) Management, a hardware/software solution for in-band server management (which will be available by the time you read this). C.A.S.E. includes an ISA card that monitors internal fans, temperature, and voltage on the system's bus. The software half of C.A.S.E. monitors OS statistics for NetWare 3.x, 4.x, and Windows NT Server 3.51. A graphical user interface allows system administrators to browse through the Affinity's system statistics. You can configure the software to dial a phone number or pager when a critical parameter is exceeded.

If low price is high priority and you don't need a mature management solution, the Affinity may fill the bill. Performance was good, and its redundant power supplies should minimize downtime.—*CL Affinity XEPro*. Direct price: \$30,120. Austin Direct, Austin, TX; 800-752-1577, 512-339-3500; fax, 512-454-1357; www.austindirect.com. Circle 455 on reader service card.

Compaq Computer Corp.

ProLiant 5000 6/200



The \$44,190 (street) ProLiant 5000 6/200 is a testament to Compaq Computer Corp.'s leadership in the server market—and it's our Editors' Choice in this roundup. Not only was the system the best performer here, it also boasts excellent hardware design, configuration, and management support. Featuring a solid construction and high-quality components, this quad-CPU server, filled with 200-MHz Pentium Pros, is built to last. Compaq adds value with its SmartStart configuration software and Insight Manager package for monitoring hardware components. The company also sells ProLiant 4500 quad-processor Pentium servers and ProSignia entry-level servers.

Compaq's entry was the clear winner on performance, leading the way on our ServerBench tests with all four processor configurations. Test scores showed good scalability from one to four processors.

The Compaq-designed motherboard accommodates four 200-MHz Pentium Pro CPUs, each with 512K of L2 cache, and Intel's 450GX chip set. The CPUs reside on drop-in cards (two CPUs per card plus two

modular voltage regulators), giving the unit an upgrade path as processor types change. Both CPU cards feature a third voltage regulator slot for an optional redundant voltage-regulator module. In the event of a processor failure, the unit will automatically map out the failed CPU and reboot. Two memory boards provide 16 DIMM slots; all were occupied by 16MB ECC DIMMs.



Compaq's ProLiant 5000 6/200 is a great all-around system, boasting class-leading server management and configuration support.

The ProLiant's storage subsystem is built around Compaq's Smart-2 Array PCI RAID controller, which supports RAID Levels 0, 1, 4, and 5. The Smart-2 card has two SCSI channels that support up to 14 devices. The card also features 4MB of on-board ECC RAM cache plus rechargeable batteries on a removable daughtercard to protect posted-write data. The Smart-2 controller also supports online capacity expansion, so if you want to add another drive to the server, it's as easy as plugging in a drive and running a utility.

The unit's tower case has only six hot-swappable drive bays, so to meet our test filter requirements, an external ProLiant Storage System provided an additional seven hot-swappable bays. The ProLiant Storage System can split the bays into two separate SCSI buses and will automatically set SCSI IDs for devices in the enclosure. Other SCSI devices can be attached to the server's on-board Fast/Wide SCSI-2 controller. Our server also packed two Com-

paq Netelligent dual-ported 10/100-Mbps NICs; each combines two separate Ethernet segments onto a single PCI adapter.

The unit's case design has not strayed from Compaq's traditional enclosure style. A lockable front panel prevents access to the hot-swappable bays but leaves the floppy disk and CD-ROM drives exposed. A small cover prevents anyone from accidentally turning off the power. The server's side panel can be removed for service; when it is removed, power is immediately cut off. An internal brace ensures that the CPU and memory cards are firmly seated in their slots at all times. But we were disappointed by the unit's lack of a redundant power supply (a \$2,799 option not included with our test system).

Compaq includes SmartStart 3.0, a bootable CD-ROM that helps you configure the system and optimize the hardware for your OS. Installation CDs for NetWare, Windows NT Server, OS/2 Warp Server 4.0, and SCO UnixWare are included. To install one of these OSs, you must purchase a system license key from Compaq. SmartStart can also be used to configure a ProLiant as an Integration Server, which acts as a central point for replicating server configurations across the network.

Compaq provides in-band management for the ProLiant through software agents and Insight Manager 3.0, the vendor's server management package. Motherboard sensors collect data on system-bus load, temperature, and fan status and relay that information to an agent. Administrative stations on the network can communicate with the server via SNMP. Peripherals including the Smart-2 controller and the Netelligent adapters also deliver statistics to Insight Manager via SNMP. Out-of-band management is handled by the vendor's Remote Insight Board.

The ProLiant 5000 is an excellent solution for a mission-critical environment, with top-notch performance and management and a wealth of redundant components. Key hardware is also covered by a prefailure warranty, so if a part begins to degrade, Insight Manager will notify you before a catastrophic failure occurs.—*CL ProLiant 5000 6/200*. Street price: \$44,190. Compaq Computer Corp., Houston, TX; 800-345-1518; fax, 713-518-1442; www.compaq.com. Circle 456 on reader service card.

SUITABILITY TO TASK

Compaq ProLiant 5000 6/200

Fault tolerance	Good
Management/configuration	Excellent
Performance	Excellent
Security/expandability	Good

Data General Corp.

Avilion AV 4900

The Avilion AV 4900 server and its companion external storage unit, the Clariion, show off some remarkable technology but at a comparatively high price. At \$64,860 (street), the Avilion provides the processing power of four 200-MHz Pentium Pro CPUs with 512K of L2 cache, and the Clariion ably handles disk storage with 20 hot-swappable drive bays (the Avilion has no hot-swappable drive bays). The Avilion performed well against the competition on our ServerBench tests, showing excellent scalability, but the spotlight was on the Clariion, which boasts many sophisticated features that take storage subsystems to a new level.

On our ServerBench tests with three and four processors, the Avilion was a strong performer up to about 20 clients, posting top-three scores behind Compaq's and Digital's entries. At high loads of 44 clients or more, however, the Avilion's performance dropped significantly: The machine finished last in the field at 60 clients with three and four CPUs installed.

The Avilion is built around an Intel Standard High-Volume motherboard, which handles two processor cards, each supporting two CPUs. Our system used ECC RAM on a memory card that allowed for a maximum of 1GB of RAM (a DIMM card that supports up to 4GB of RAM is also available). Three redundant hot-swappable power supplies lie behind the unit's front panel. Behind the power supply module, four large fans direct airflow. Our system was also configured with four Digital DE500 10/100-Mbps Fast Ethernet PCI adapters, a modem, the NTAAlert Module (DG's EISA adapter for out-of-band management), and an Intel LANDesk module.

The Clariion external drive subsystem is the most sophisticated fault-tolerant mass-storage system we've ever seen. The 20-bay unit came with 17 2GB hard disks, although

we only used 9 for testing (for a 17-drive configuration, add about \$12,000 to the above price). It is the Clariion that provides storage subsystem services through a pair of hot-swappable storage processors, each connected to the Avilion by a Fast/ Wide differential SCSI adapter. Inside the Clariion there are five SCSI buses with four disks connected on each bus. These five buses connect to both storage processors, providing total redundancy. In case of failure, the second processor takes over without intervention from the network administrator. The storage processors support RAID Levels 0, 1, 3, 5, and 0+1.

The rear panel of the Clariion houses six redundant cooling fans. Opening the rear panel reveals the storage processors, three hot-swappable power supplies, and a battery backup for the mirrored disk



Data General's Avilion and Clariion duo provide a wealth of redundant components to ensure maximum uptime for your network.

cache. An SNMP-based program, Array Guide, provides local management of the Clariion using a graphical user interface. The unit can also be managed through a console port using text-based terminals.

For out-of-band management of the Avilion, you can use the NTAAlert Module to contact DG's technical staff (service included with the unit's warranty for one year, a fee-based contract afterwards). If the Avilion crashes, the NTAAlert Module runs diagnostics on the CPU and memory. It then makes a modem connection with Data General and reports the problem and data, which DG technicians use to help diagnose the problem. Through Symantec's pcAnywhere32 7.5, DG technicians can take control of your system remotely to fix problems.

Our test unit also included LANDesk for in- and out-of-band management. The

LANDesk module is an ISA adapter that supports a PC Card modem for remote dial-in. LANDesk allows administrators to monitor system voltage and temperature remotely, as well as many other system statistics. Administrators can also remotely reboot the machine if the OS hangs.

If a high-availability solution is critical to your business, the Avilion and Clariion duo are a good choice, combining redundant hardware with top-notch support.—CL
Avilion AV 4900. Street price: \$64,860. Data General Corp., Westboro, MA; 800-328-2436, 508-898-5000; www.dg.com. Circle 457 on reader service card.

Digital Equipment Corp.

Prioris 6000 Series ZX 6200MP/4

State-of-the-art hardware and top-notch management software support characterize Digital Equipment Corp.'s \$39,990 (street) Prioris 6000 Series ZX 6200MP/4. This server is designed to grow with your business: Memory expansion potential is the roundup's best at 4GB, and you can use the included Prioris External Array (a modular external storage cabinet) in a clustering environment with Digital's Clusters for Windows NT software. The Prioris 6000 garnered highly competitive scores on our ServerBench tests.

In testing the Prioris 6000 with one-, two-, and three-CPU configurations, we saw throughput numbers that were slightly below those of the front-running Compaq ProLiant 5000 6/200. Unfortunately, with four CPUs, performance slipped at a 20-client load and continued to decline until it matched the two-CPU results.

The Digital motherboard features Intel's 450GX core-logic chip set. Two processor cards are connected to the motherboard through a pair of local-bus slots; each card holds two Pentium Pro CPUs and two slots for voltage regulator modules. Each of the four 200-MHz Pentium Pro CPUs has 512K of L2 cache. The motherboard has two slots for add-in memory cards (each of which can hold 12 memory modules), as well as 8 SIMM sockets integrated onto it. Our unit's 256MB of ECC RAM used a four-way interleaved design to provide a 256-bit-wide data pipeline to the CPU.

SUITABILITY TO TASK

Data General Avilion AV 4900

Fault tolerance	Excellent
Management/configuration	Good
Performance	Good
Security/expandability	Good

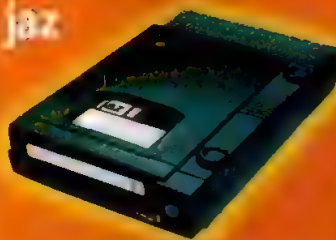
Removable one-gig disks,
unlimited space,
fast as a hard drive.

For the nearest dealer, call:
888-2-IOMEGA, ext. j20
Or see us at: www.iomega.com



The Jaz™ drive is you, man. It's fast, it holds tons of stuff, and it's personal. You won't find an easier or cooler way to upgrade your hard drive. Just connect it to your PC or Mac and you're jammin': files, pictures, graphics, video, CAD stuff, whatever. And with its dark green color, hey, the cat's got style.

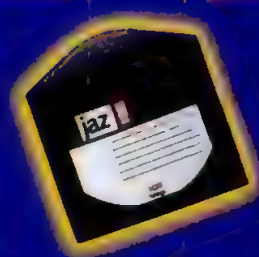
jaz



The Unlimited Personal Hard Drive.

Endless storage space.

Load and edit projects instantly.
Goes anywhere you go



1GB disks for as low as \$99.95.

Compact one-gigabyte cartridges.
Great for graphics, sound, and video.
Portable files. Fast, easy backup.



BECAUSE IT'S YOUR STUFF.

CIRCLE 146 ON READER SERVICE CARD

BENCHMARK TESTS

Application Servers



The Compaq ProLiant 5000 6/200—this roundup's Editors' Choice—delivered record-breaking scores on our ServerBench

tests. With high-speed multiprocessor scalability, the ProLiant maintained a firm grip over the competition.

What the Numbers Mean

Our first roundup of Pentium Pro-based servers shows that Intel's top processor has raised the bar in terms of sheer server performance. In the past, x86 servers—whose market has been dominated in the past by sales of Pentium-based systems—were mainly relegated to the file and print services arena, for the simple reason that they didn't have the processing horsepower necessary for a transaction-based client/server environment. The arrival of these Pentium Pro servers, however, may change the face of the market's landscape.

Testing showed these products to be capable of delivering the level of performance needed in an enterprise-class application server environment—an environment that up until now has been the domain of RISC-based Unix systems costing upwards of \$100,000. These new Pentium Pro machines provide not only powerful multiprocessing capabilities but enormous memory capacities and high-speed peer-to-peer PCI buses—all needed to satisfy the hunger of high-volume, transaction-based client/server applications. And they deliver these features and capabilities at a fraction of the cost of their RISC-based competition.

Pentium Pro: Built for Performance

The architectural differences that set the Pentium Pro apart from Intel's fifth-generation Pentium are exactly the features that

make it an ideal CPU for application server environments. Unlike file servers, which simply process requests in a file cabinet-like procedure, application servers are all about the power of multiple CPUs, because they must do the thinking required by on-board applications to satisfy rapid-fire requests from numerous clients.

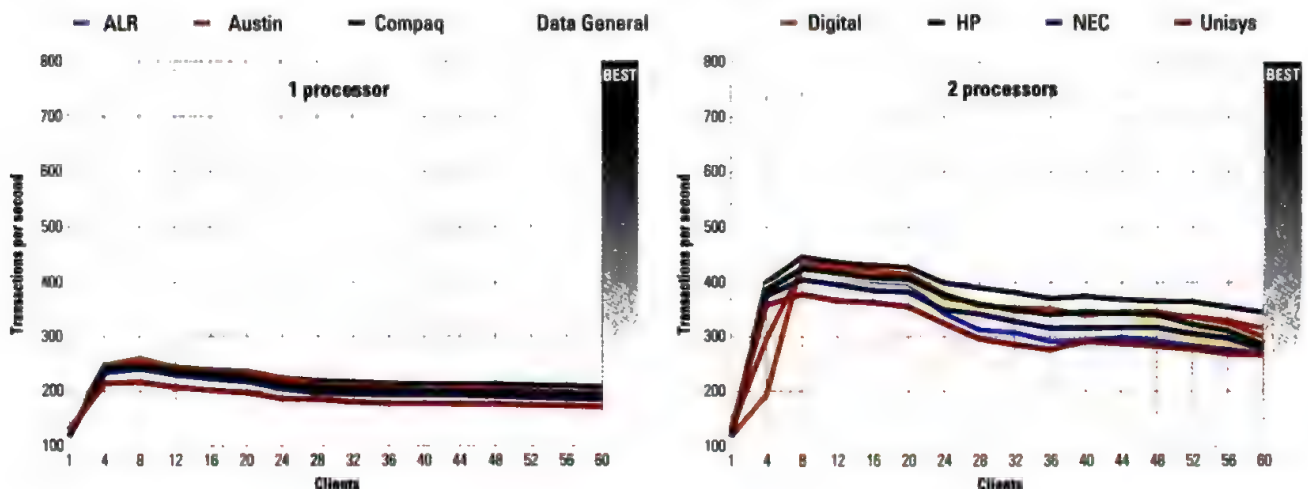
The Pentium Pro was designed to deliver top performance with 32-bit software and operating systems such as Windows NT Server—through features such as its internal dynamic execution engine, which Intel fully optimized for 32-bit environments. CPU performance also gets a boost from L2 cache: The Pentium Pro has an integrated, nonblocking L2 cache chip that is able to communicate with the core processor at the processor's clock rate. This contrasts sharply with older Pentium designs that rely upon off-board L2 cache; these designs limit cache operational speed to the system bus speed (60 or 66 MHz, depending upon the CPU clock speed). The Pentium Pro's on-board L2 cache minimizes the latencies introduced with an external cache by communicating in a point-to-point connection. This allows for greater bandwidth, which fully utilizes the CPU speed and in turn creates a higher cache hit ratio.

System Integration

The Compaq ProLiant 5000 6/200 was the clear performance leader on our ServerBench tests, but all of the servers in this roundup produced higher scores than we've encountered during any previous testing. They also showed excellent scalability from one to four processors (when requests tend to fit in cache), though some systems proved more scalable than others. The test scores posted by the Austin Affinity XEPro, Data General Avilion AV4900, Digital Prioris 6000 Series ZX 6200MP/4, and HP Net-Server LX Pro were, on the average, within 3 to 6 percent of the Compaq server's peak scores at all four processor levels. But the ALR Revolution Quad6 6200/512 and NEC ProSera SH did not fare as well, falling solidly in the second tier. The Unisys Aquanta QS/6 consistently submitted the lowest numbers; its scores were 25 to 30 percent lower than the Compaq server's in all test configurations.

All of these servers use the same 200-MHz Pentium Pro processors with 512K integrated L2 cache and Intel's 450GX PCI chip sets, as well as—in many cases—identical components (including hard disks and RAID controllers). But our tests revealed

ServerBench Standard Mix



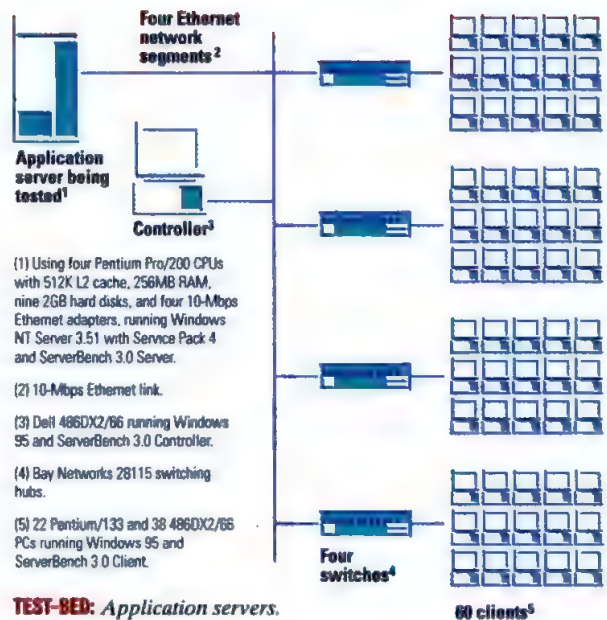
that it's not just the components that make the difference; it's how well those components and their respective drivers are integrated, configured, and optimized. Our standard ServerBench test mix takes this factor into account by evaluating a server as a whole system unit and gauging how well its components (including network interface cards, hard disk subsystems, system bus, and memory subsystem) interact with one another.

The 450GX PCI chip set, while offering a high-performance solution for Pentium Pro servers, is not without some initial problems and required workarounds. Among its advantages is its ability to support peer-to-peer PCI buses, for a theoretical aggregate I/O throughput of 267 MBps. Motherboard designs, as well as proper selection and placement of I/O devices such as LAN and SCSI adapters, are required for accomplishing top performance.

Although the chip set allows the bridging of peer buses—eliminating the prior electrical-load limits for available PCI slots—some configurations should be avoided. Programmed I/O devices such as ISA LAN adapters and EISA devices can affect system performance. PCI bus-mastering devices should be used, because the CPU will consume PCI bandwidth servicing programmed I/O devices. High-traffic PCI devices should also avoid the PCI bus to which the EISA bus is bridged. Additional testing revealed that PCI devices with their own on-board bridging chips (such as multiport LAN adapters) are nearly impossible to configure.

The 450GX chip set offers greater bus efficiency by supporting multiple, pipelined transactions and deferred replies—with the CPU having up to four transactions on the processor bus, and bridging and memory controllers supporting an in-order queue (IOQ) depth of either 1 or 8. Testing revealed that a system can become unstable using an IOQ depth of 8 in certain configurations; Intel recommends running the system at a default IOQ depth of 1.

The ProLiant shows that building key subsystem components in-house can make a difference in performance. This server uses a Compaq-designed and -manufactured motherboard, as well as the vendor's own (although not proprietary) Netelligent network interface cards and Smart-2 Array Fast/Wide SCSI-2 RAID controller. Compaq has optimized these components and their respective drivers for several OS environments, including Windows NT. Like other controllers, the Smart-2 Array offers features such as read-ahead and write-back caching, but its schemes

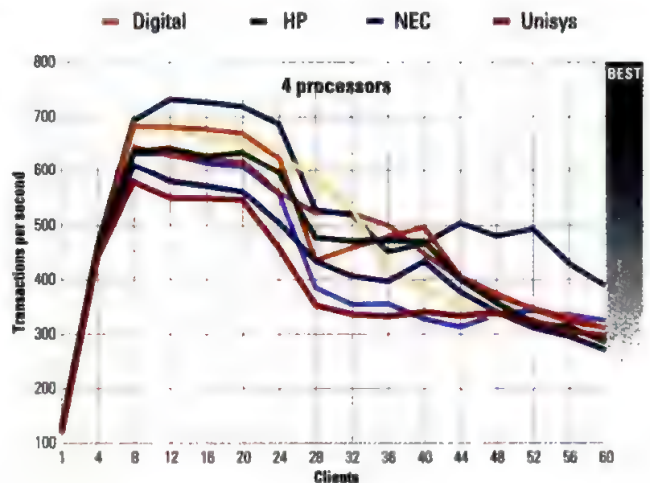
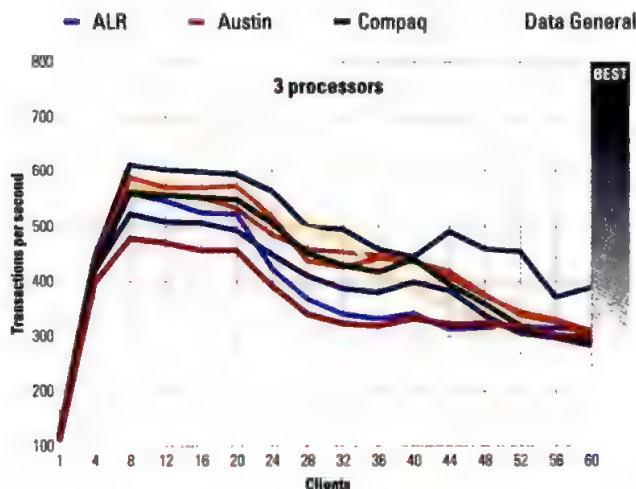


are adaptive as opposed to fixed. When nonsequential data is sensed, read-ahead will disable, avoiding performance loss by eliminating the overhead of the algorithm attempting to read blocks of data sequentially.

The ALR Revolution Quad6 6200/512 and the Unisys Aquanta QS/6 also show that choosing components carefully makes a big difference in performance. Although these servers' motherboards are identical (ALR designs and manufactures the board, and Unisys resells it under its own name), they use different NICs (Cogent EM110 TX and 3Com Fast EtherLink NICs, respectively). The Cogent cards found in the ALR machine are known for low CPU utilization in servers and will likely offer a performance edge. The 3Com cards used in the Unisys server ship with a driver that is documented to have bus-mastering contentions in Windows NT. Bus mastering provides a high level of data transfer, reducing

Continues

ServerBench Standard Mix



Microsoft Project

not only helps **plan**
it even nags

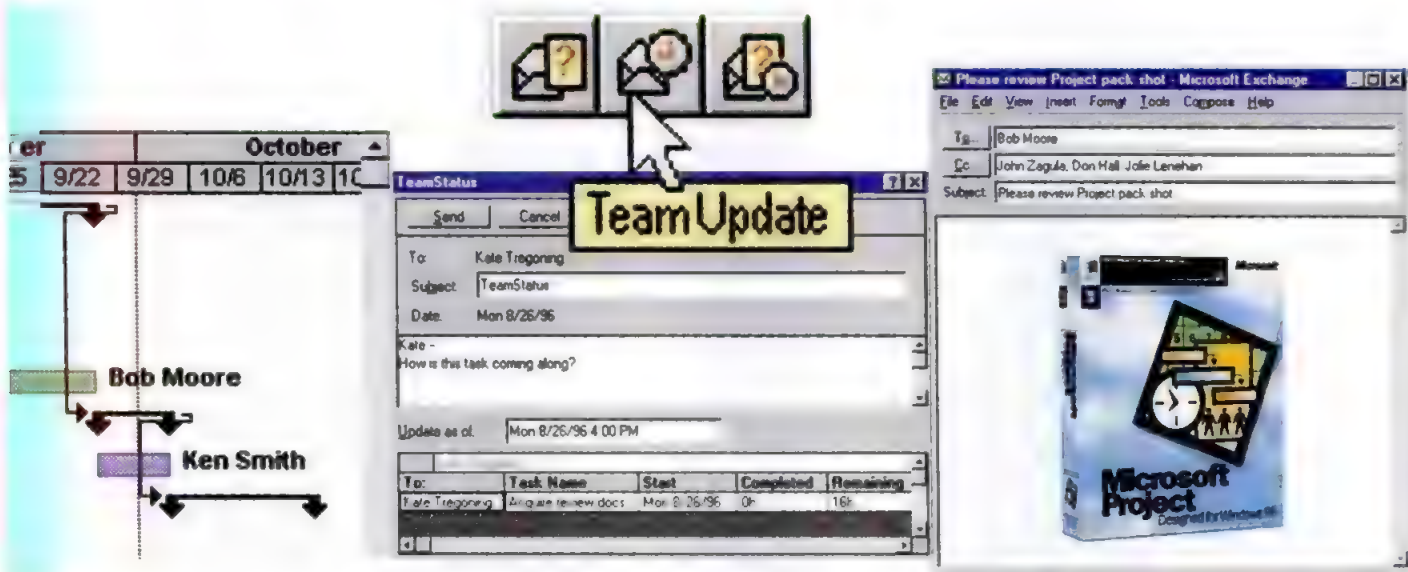
The screenshot displays the Microsoft Project software interface. On the left, a Gantt chart shows a project schedule for August 1996. The main window features a task list with columns for WBS, To Do, and Time. A task named 'Review Product' is highlighted, showing its duration as 24 days. Below the task list, a 'Planning Wizard' dialog box is open, displaying a cartoon character and a message: 'You moved 'Site Evaluation' to start on a nonworking day.' To the right, a Gantt chart shows a task named 'Kate Tregoning'.

WBS	To Do	Time
1	Review Product	24d
1.1	Acquire review docs	2d
1.2	Read review Docs	7d
1.3	Review cost studies	14d
1.4	Planning Wizard	
2		
2.1		
3		

*Microsoft Project works with Microsoft Mail, cc: Mail, Lotus Notes, and the Microsoft Exchange Inbox for Windows 95.

©1996 Microsoft Corporation. All rights reserved. Microsoft, Windows and Where do you want to go today? are registered trademarks or trademarks of the Microsoft Corporation. Other product and company names mentioned herein may be the trademarks of their respective owners.

and manage a job, people to get it done.



Imagine one of those big white planning boards that automatically updates itself and informs you of everyone's progress and delegates tasks and just generally makes sure everything that needs to get done for your project gets done on time. That's **Microsoft® Project for Windows® 95**. Because it's part of the **Microsoft Office** family, you'll find familiar tool bars and commands that you already know how to use. **Planning wizards** walk you through every

step of planning a project, helping you figure out how to fix problems and build a better plan. You can switch your perspective from **Gantt Charts** to a **monthly calendar** view with the click of a mouse. And integration with popular **e-mail** systems* means that Microsoft Project will automatically communicate tasks, assignments and schedule changes to everyone on your team. With all of this taken care of, you can concentrate on being your usual happy-go-lucky self.

Microsoft®

Where do you want to go today?™

www.microsoft.com/msoffice/project/

BENCHMARK TESTS

Continued

CPU utilization by offloading controller management.

When administered using one- and two-CPU configurations, our tests are CPU-bound; performance is constrained at the processor level. But when we tested systems with three and four CPUs, the higher peaks displayed in the test results represent the full capabilities of each server (with the ServerBench data set contained entirely within cache from 8 to 28 clients). These results reflect how well each server's processor-to-memory subsystem has been implemented, as well as the performance of the NIC and SCSI drivers. As heavier client loads are added, the tests are then bound by disk subsystem performance. This explains why, at loads of 32 to 60 clients, we see comparable performance among servers with similar disk subsystems.

Chasing the Bottleneck

We also ran the ServerBench Disk Subsystem test suite to evaluate the relative performance of each machine's SCSI subsystem. I/O subsystem performance is crucial in client/server environments, as faster processors and high-speed networking have eliminated two bottlenecks. The disk suite tests each disk subsystem by loading each server with large files that run completely outside system cache, regardless of the client load. The results of these tests revealed the obvious advantage of the AMI MegaRAID Series 428 Ultra SCSI controller and Seagate Ultra SCSI hard disks, components found in the Austin Affinity XEPro, the only system here to provide an Ultra SCSI solution on both ends. Ultra SCSI boosts data-transfer rates from the 20 MBps supported by Fast/Wide SCSI-2 to 40 MBps per channel, still well within the range of the PCI-bus rate. The Unisys Aquanta QS/6 used the same AMI Ultra SCSI controller, but the vendor currently provides only Fast/Wide SCSI-2 hard disks. The Data General Avion also did well on these tests, because Data General, like Compaq, has developed and optimized its own RAID engine and algorithm as part of its Clarion disk array.

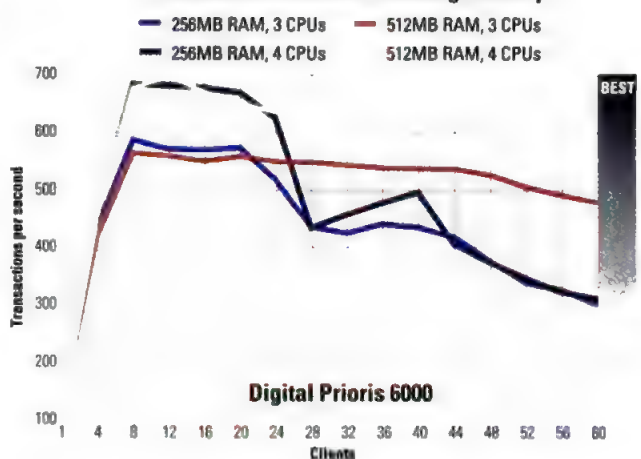
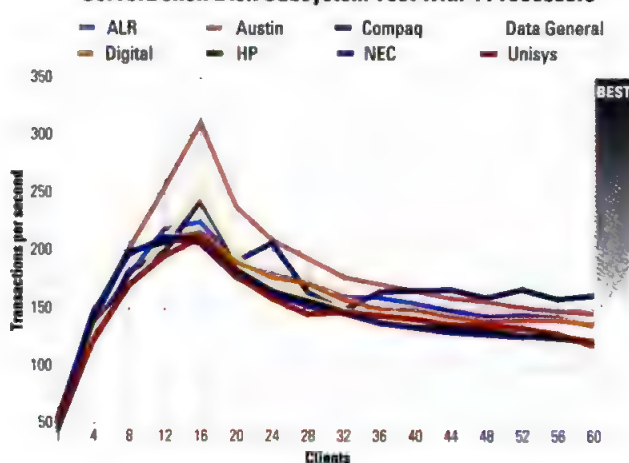
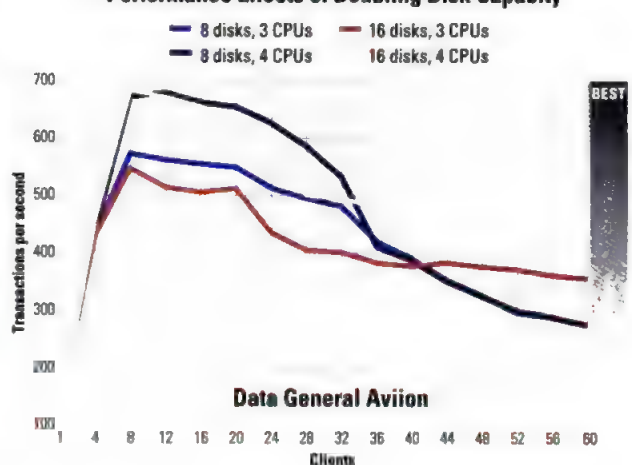
As a further test of the effects of disk and memory subsystems on these servers, we doubled the memory in the Digital Prioris 6000 (to 512MB), doubled the number of hard disks in the Data General Avion (to 16 in a RAID Level 0 array), and retested them. Both systems displayed dramatic performance

improvements at large client loads with three and four processors. During standard testing, they had not only saturated main memory but were bottlenecked at the disk level as well. With four processors, the Prioris experienced a performance gain of nearly 50 percent as client loads increased from 28 to 60; the Avion's additional eight disk spindles boosted performance by 35 percent from 32 to 60 clients.

During testing, we also discovered some anomalies, most evident in the Compaq and Digital units' performance curves between 20 and 30 clients (when test files are contained in disk). Inspection of each client's results revealed that the test data files were largely resident in RAM for some clients. Ziff-Davis Benchmark Operation is investigating this behavior.—*Analysis written by Jeffrey G. Witt*

How We Tested

We tested each Pentium Pro server using Version 3.0 of the Ziff-Davis benchmark test suite ServerBench. We tested one-, two-, three-, and four-processor configurations using the standard test mix (SYS_60.TST), which exercises a combination of different client requests. The tests are designed to stress each server's three major subsystems: processor/memory, disk, and network (including network interface cards and associated drivers). We

Performance Effects of Doubling Memory**ServerBench Disk Subsystem Test with 4 Processors****Performance Effects of Doubling Disk Capacity**

also ran a disk test suite (D_60.TST), which gauges the performance of each server's disk subsystem.

In each testing scenario, we attached the servers to our 60-client test network over four 10-Mbps Ethernet segments. We attached 15 clients to each segment to ensure even client distribution, and to make sure that test results would not be affected by the network infrastructure. Test results are reported in transactions per second, a measurement that represents the time that a server takes to respond to and process requests issued by the networked clients. Modeled after typical application server operations, the actual test work takes place on the server itself.

Our ServerBench tests submit workloads starting with 1 client, then 4 clients. Clients are then added in 4-client increments, up to our 60-client maximum. Because each client submits requests to the server as fast as it can send them, a single client can actually represent many users in a real-world scenario.

We tested all servers with Microsoft Windows NT Server, Version 3.51, including its latest update, Service Pack 4. Client segments comprised 15 identical combinations of Pentium/133- and 486DX2/66-based PCs running Windows 95. We used native OS TCP/IP stacks for the transport protocol; these were physically connected via Bay Networks' LattisSwitch 28115 switches. Each tested server had four 200-MHz Pentium Pro processors with 512K of on-board L2 cache, 256MB of ECC main memory, and nine 2GB hard disks. Each vendor submitted its choice Ethernet adapters and hardware RAID controller. We required that RAID controllers support hardware RAID Level 0 as a minimum.

We configured the hard disk subsystems in the following manner. One disk (containing the operating system) was connected at the discretion of the vendor in one of three ways: via a separate controller, on the data drive's SCSI chain, or via a third channel on the submitted RAID controller. The remaining eight hard disks (the ServerBench data drives) were formatted using Windows NT 3.51's file system (NTFS) and split over two channels or controllers. For optimal performance, and in order to distribute the data evenly across all eight spindles, the data drives were configured in a RAID Level 0 array (which provides no fault tolerance).

You can download ServerBench 3.0 from ZDNet (GO ZDBENCH) or the World Wide Web (www.zd.com).

The Prioris 6000 has seven PCI slots, four EISA slots, and one shared PCI/EISA slot. The PCI slots have a dual peer-to-peer design, which allows all PCI devices equal attention from the CPU. In our unit, Digital's 10-Mbps Ethernet adapters occupied four PCI slots. An Adaptec 2940W PCI SCSI adapter connects to the quad-speed CD-ROM drive and the OS boot volume, and a Mylex DAC960 PCI RAID con-



Digital's Prioris provides the necessary hardware and software to service a large network.

troller is connected to the external drive enclosure's SCSI backplane. That controller uses two channels to control up to 14 SCSI devices and supports RAID Levels 0, 1, and 5.

Our unit's RAID subsystem was split between the server's internal hot-swappable drive bays and the external drive unit (which has its own pair of redundant, 450-watt power supplies). We found the server's hot-swappable drives difficult to remove. The external case, however, can support up to seven devices. Our server came with nine Seagate 2GB 7,200-rpm Fast/Wide SCSI-2 hard disks.

The Prioris 6000 is housed in a wide tower case with dual 450-watt redundant power supplies. The processor cards keep cool with a pair of redundant fans; two more redundant fans ventilate the memory and peripherals.

The system includes Digital's Server-

Works Quick Launch 2.0, which guides users through first-time configuration; you can also use it to replicate existing configurations. This bootable CD-ROM aids in the installation of NetWare 3.x and 4.x, SCO Unix, OS/2 Warp Server, and Windows NT Server 3.51.

Digital provides ServerWorks Manager 2.0 for graphical monitoring of the Prioris 6000 and any other SNMP-compliant devices. For out-of-band management, Digital offers the Prioris Remote Server Manager (RSM) adapter, an OS-independent EISA board with a built-in modem and its own power supply; it supports remote rebooting and hardware monitoring. You can set up the Prioris 6000 in a clustering environment by adding Digital's Clusters for Windows NT software (\$995 list).

Digital's Prioris is a complete, ready-to-run package with superior configuration and management support and the potential to grow with your business.—*CL*
Prioris 6000 Series ZX 6200MP/4. Street price: \$39,990. Digital Equipment Corp., Acton, MA; 800-344-4825, 508-493-5111; fax, 508-480-8583; www.pc.digital.com. Circle 458 on reader service card.

Hewlett-Packard Co.

HP NetServer LX Pro

From its triad of redundant hot-swappable power supplies to its easily serviceable design and top-notch configuration and management support, Hewlett-Packard's HP NetServer LX Pro, our roundup's honorable mention, would make a great addition to any mission-critical enterprise server environment. HP includes guides to configuring components and installing the operating system, and even tips for optimum tuning. This \$41,710 (street) server also offers the easiest access to system components of any machine in this roundup.

The NetServer's performance on our ServerBench tests placed it consistently in the middle of the pack at each CPU level. Performance scaled evenly up to three CPUs, but with more than 40 clients, throughput numbers were virtually the same with three CPUs or four.

The list of hardware features is impressive. Four 200-MHz Pentium Pro CPUs, each with 512K of L2 cache, sit on two processor boards that each have integrat-

SUITABILITY TO TASK

Digital Prioris 6000 Series ZX 6200MP/4

Fault tolerance	Good
Management/configuration	Excellent
Performance	Good
Security/expandability	Good

SUMMARY OF FEATURES

Application Servers



■ YES ■ NO □ OPTIONAL

Products listed in alphabetical order

	ALR Revolution Quad6 6200/512	Austin Affinity XEPro	Compaq ProLiant 5000 6/200	Data General Avilion AV 4900	Digital Prioris 6000 Series ZX 6200MP/4	HP NetServer LX Pro	NEC ProServe SH	Unisys Aquantia QS/6
Price of tested configuration	\$31,399 (street)	\$30,120 (direct)	\$44,190 (street)	\$64,860 (street)	\$39,992 (street)	\$41,710 (street)	\$39,250 (street)	\$33,600 (street)
Maximum number of processors supported	4	4	4	4	4	4	4	4
Processor location	Motherboard	Expansion card (2)	Expansion card (2)	Expansion card (2)	Expansion card (2)	Expansion card (2)	Expansion card (2)	Motherboard
Installable system RAM	2GB	1GB	4GB	1GB	2GB	2GB	1GB	2GB
Motherboard manufacturer (and model, where available)	ALR	AMI Goliath Series 730	Compaq	Intel Alder	Digital	Intel PALBBRD	NEC	ALR SFE6000151
Chip set manufacturer and model	Intel 450GX	Intel 450GX	Intel 450GX	Intel 450GX	Intel 450GX	Intel 450GX	Intel 450GX	Intel 450GX
Network interface card (speed and interface)	Cogent EM110 TX (10/100 Mbps, PCI)	Cogent EM110 TX (10/100 Mbps, PCI)	Compaq Netelligent 10/100 TX PCI UTP (10/100 Mbps, PCI)	Digital DE500 (10/100 Mbps, PCI)	Digital DE450 (10 Mbps, PCI)	HP DeskDirect (10/100 Mbps, PCI)	Digital DE500 (10/100 Mbps, PCI)	3Com Fast EtherLink (10/100 Mbps, PCI)
Disk Subsystem								
Hard disk manufacturer and model (and interface)	Seagate ST32107E (Fast/Wide SCSI-2)	Seagate Barracuda ST32171WC (Ultra SCSI)	Seagate Barracuda ST32550W (Fast/Wide SCSI-2)	Seagate Barracuda ST32550N (Fast/Wide SCSI-2)	Seagate Barracuda ST32550W (Fast/Wide SCSI-2)	Seagate Barracuda ST32550WC (Fast/Wide SCSI-2)	Seagate Barracuda ST32550WC (Fast/Wide SCSI-2)	Seagate Barracuda ST32550WC (Fast/Wide SCSI-2)
RAID controller	AMI MegaRAID Series 418	AMI MegaRAID Series 418	Compaq Smart-2 Array	Clarion Storage Control Processor	Mylex DAC960PL PCI	Mylex DAC960PL PCI	Mylex DAC960 PCI	AMI MegaRAID Series 418
Hot-swappable drive bays in use in the CPU unit	9 (of 9)	9 (of 12)	4 (of 6)	N/A	5 (of 7)	8 (of 12)	4 (of 7)	9 (of 15)
Hot-swappable drive bays in use in the external cabinet	N/A	N/A	5 (of 7)	9 (of 20)	4 (of 7)	N/A	4 (of 7)	N/A
RAID controller hardware cache (installed/maximum)	8MB, 128MB	8MB, 128MB	4MB, 4MB	16MB, 64MB	8MB, 32MB	4MB, 32MB	8MB, 32MB	8MB, 128MB
RAID controller memory type (and packaging)	DRAM (SIMMs)	DRAM (SIMMs)	ECC (surface-mounted)	ECC (SIMMs)	ECC (SIMMs)	ECC (SIMMs)	ECC (SIMMs)	Parity (SIMMs)
RAID controller battery backup	■	■	■	■	■	■	■	■
RAID levels supported by disk controller	0, 1, 3, 4, 5	0, 1, 3, 4, 5	0, 1, 4, 5	0, 1, 3, 5	0, 1, 5	0, 1, 5	0, 1, 5	0, 1, 3, 4, 5
Disk-controller channels	3	3	2	5	2	2	2	3
Expandability								
Number of SIMM slots in use	8 (of 8)	8 (of 8)	16 (of 16)	8 (of 16)	16 (of 32)	16 (of 16)	8 (of 16)	16 (of 16)
Location of SIMM slots	Expansion card	Expansion card	Expansion card	Expansion card	Expansion card and motherboard	Expansion card	Expansion card	Expansion card
Memory packaging	SIMMs	DIMMs	DIMMs	SIMMs	SIMMs	SIMMs	SIMMs	SIMMs
Expansion-bus slots	7 EISA, 7 PCI, 1 PCI/EISA	3 EISA, 5 PCI, 1 PCI/EISA	1 EISA, 5 PCI, 2 PCI/EISA	4 EISA, 6 PCI	4 EISA, 7 PCI, 1 EISA/PCI	4 EISA, 6 PCI	4 EISA, 6 PCI	7 EISA, 7 PCI, 1 PCI/EISA
Accessible drive bays (3.5", 5.25")	2, 5	1, 4	0, 3	1, 2	1, 1	0, 3	1, 3	2, 1
Power supplies (total number)	575W (2)	300W (3)	488W (1)	330W (3)	450W (2)	410W (3)	300W (2)	575W (2)
Redundant/hot-swappable power supplies	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Security and Fault Tolerance								
Lockable hard disk subsystem	■	■	■	■	■	■	■	■
Lock for power and reset buttons	■	■	■	■	■	■	■	■
Lock for front panel and case	■	■	■	■	■	■	■	■
Software Management								
Management software	InforManager	None	Insight Manager	Array Guide, LANDesk, NT Alert	ServerWorks	HP NetServer Assistant	LANDesk	LANDesk
Management hardware	InforManager	None	Remote Insight Board	Extended Service Board, LANDesk, NT Alert	Remote Server manager	Remote Assistant	LANDesk card	LANDesk card, sensors on motherboard
Configuration software	None	None	Compaq SmartStart 3.0	Array Guide	Quick Launch 2.0	HP NetServer Navigator	None	FlexRAID
Service and Support								
7-day, 24-hour live technical support	■	■	■	■	■	■	■	■
Prefailure warranty	■	■ (fans, hard disks, power supplies, system RAM)	■ (CPUs, hard disks, NICs, power supply, RAID controller, system RAM)	□	□	■ (hard disks, system RAM)	■	■
Warranty (parts/labor)	3 years	3 years	3 years	1 year	3 years	3 years	3 years	3 years
On-site service charge (term)	\$9.95 (1 year)	Included (1 year)	Included (1 year)	Included (1 year)	Included (1 year)	Included (3 years)	Included (3 years)	Included (3 years)

N/A—Not applicable. The product does not have this feature.



You
supply
the
blood
sweat
ideas
coffee
grit
midnight oil

We'll
print
the
budgets
envelopes
proposals
presentations
labels
letters

The
Okidata
OL600e

6 pages per minute
of laser class output

600 dpi class output

Windows® 95 and
DOS compatible

5 year LED printhead
limited warranty

\$399*

1-800-OKI-TEAM x636
<http://www.okidata.com>

OKIDATA®
a Division of Oki America, Inc.

They're your ideas.
We just help.

Okidata makes a full line of Windows, DOS and Adobe® PostScript™ compatible personal business printers. We have 24 years and over 9 million printers worth of experience. Start something. Start anything. We'll finish it. For a full spec sheet, call Fax Back 1-800-654-6651. Ask for document 1014.

*Estimated retail price in the U.S. Actual price may vary. System requirements: 8 MB PC RAM & 8 MB free space on hard drive; Windows 3.1, 3.11, or Windows 95. ©1998 Okidata Rep. T.M., M.D. Oki Electric Industry Co., Ltd. They're your ideas. We just help. T.M. Oki America, Inc. Adobe, PostScript T.M. Adobe Systems, Inc. Windows Reg. T.M. Microsoft Corp.

ed voltage regulators. The memory board contains 16 SIMM slots, for a maximum of 2GB of ECC RAM. The server uses HP's "memory scrubbing" technology, which HP says prevents double-bit memory write errors. The CPUs and memory boards easily slide in and out on guide rails, and both boards have clips to secure them in their slots. This server, like Data General's entry, uses Intel's SHV motherboard.

The on-board Adaptec Fast/Wide SCSI-2 controller provides access to a primary-boot hard disk and a quad-speed CD-ROM drive. The Mylex DAC960PL PCI two-channel RAID controller with 4MB of cache supports RAID Levels 0, 1, and 5. The tower case can accommodate up to 12 hot-swappable hard disks on two



HP provides all of the tools for its NetServer LX Pro to ensure painless setup and maintenance.

logical SCSI channels. The hot-swap modules slide out easily and can be locked to prevent unauthorized access. You can also lock two front panels to block access to all drive bays. Our unit also included nine Seagate Barracuda 2GB hard disks.

The machine is by far the easiest to service of all the servers in this roundup. Its motherboard is mounted horizontally near the top of the server enclosure; a removable top panel provides easy access. You can also remove side panels to access the disk array and power-supply cabling. If one of the three 410-watt redundant power supplies fails, you can swap it out

without opening the case or shutting down the system. (The server can operate on two power supplies.) Two large cooling fans circulate air throughout the case. Sensors will detect dangerous temperature levels and shut down the system.

Other components include four HP DeskDirect 10/100TX-Mbps PCI Ethernet adapters (actually a licensed version of Intel's Pro/100B card) and an embedded Cirrus Logic graphics controller. The system has six peer-to-peer PCI slots and four bus-mastering EISA slots.

Configuration is a snap with HP's NetServer Navigator bootable CD. An installation road map clearly tells you how to prepare the server for configuring. Also on the CD, Configuration Assistant helps you configure peripherals, create disk arrays, and produce a driver disk for the appropriate OS. The CD also includes Information Assistant, which has online documentation and numerous drivers. You can access the EISA configuration utility and the disk array utility (JetSet) during bootup without the CD.

HP's NetServer Assistant, an SNMP-based utility, provides server management. It runs under HP OpenView for in-band management of all SNMP-capable devices, and it can manage multiple NetServers on local and wide area networks. You can set alarms to notify you of any actual or even potential hardware failure.

The NetServer is an impressive system in all respects, offering good performance and an incredibly easy-to-service design. Its management solution is among the best, and it snaps easily into HP's OpenView to manage larger environments.—CL

HP NetServer LX Pro. Street price: \$41,710. Hewlett-Packard Co., Palo Alto, CA; 800-322-4772; fax, 800-333-1917; www.hp.com. Circle 459 on reader service card.

NEC ProSera SH

NEC's ProSera SH (street price \$39,250) shows promise, but compared with the others in this roundup it has a way to go. A peek inside the tower case reveals inefficient use of space and a nightmarish tangle of cabling that would make servicing the system arduous. One bright spot is the ProSera's unique method of communicating with its exter-

nal drive subsystem. Besides a proprietary data cable that allows the server to control the external unit's array settings, the ProSera features a second cable that monitors the external unit's power level and signals it to power up or down. The ProSera line marks NEC's entry into the Intel-based server market; the vendor previously sold MIPS-based servers.

In the performance arena, the ProSera fell short, posting bottom-tier results on our ServerBench tests with three and four CPUs. The unit also had difficulty scaling: Its scores with four CPUs and a



NEC's ProSera SH and its storage unit provide 14 hot-swappable drive bays for expansion.

load of 44 to 56 clients were comparable with its scores with three CPUs enabled; with 60 clients, its scores were lower.

The ProSera's NEC motherboard has four CPU sockets—filled with 200-MHz Pentium Pros with 512K of L2 cache each—split between two add-in processor cards. NEC includes both cards with the unit, even for the single-CPU basic configuration, easing upgrades. The test unit's ECC memory also resided on a card, which had a maximum capacity of 1GB.

The unit's storage subsystem is built around a Mylex DAC960 RAID controller, which supports RAID Levels 0, 1, and 5. The controller has two Fast/Wide SCSI-2 channels and 8MB of cache; hooked to it are nine 2GB Seagate Barracuda hard disks, split between the server and an external storage subsystem.

The storage unit actually uses the same kind of tower case as the server, so they are indistinguishable. Each offers seven hot-swappable drive bays; in the storage unit, this leaves about 75 percent of the cabinet empty—not an ideal use of space.

SUITABILITY TO TASK

HP NetServer LX Pro

Fault tolerance	Good
Management/configuration	Excellent
Performance	Good
Security/expandability	Excellent

The hot-swappable drive caddies did not fit well into either case and were difficult to use. The only advantage of NEC's hot-swappable drives is that they come with empty swap cases—handy if you plan to upgrade storage yourself.

The server also features dual 300-watt redundant power supplies. A third power supply can be added to the system for an additional \$1,150. The external storage unit has three redundant power supplies. Other components include Digital DE500 PCI Fast Ethernet adapters and an on-board Adaptec Fast/Wide SCSI-2 adapter.

Security features for the ProSera are rudimentary but functional. The front panel of the ProSera's case is divided into three parts: The top panel covers the floppy disk and CD-ROM drives; a lower panel opens to reveal the hot-swappable drive bays, and a third panel protects the power switch from accidental shutoff. All three front panels are lockable.

The unit uses Intel's LANdesk Server Manager module and custom hardware to provide server management tools. NEC's server management applet, called ESRAS (Enterprise Server Reliability Availability Serviceability), keeps a log of memory errors, hardware crashes, operating-system errors, and temperature and voltage problems. LANdesk, which is a combination hardware-and-software management product, monitors system vital signs and temperatures. Its hardware component, an EISA card, features a PC Card modem with battery backup for out-of-band management, as well as a temperature-sensor wire, which can be positioned at various points inside the server's case to measure the temperature. The system can be powered down using a software switch.

The ProSera comes from a reputable vendor, but it definitely represents a work in progress. Its immaturity as a complete solution may give buyers pause.—CL

ProSera SH. Street price: \$39,250. NEC, Boxborough, MA; 800-325-5500, 508-264-8000; fax, 800-366-0476; www.nec.com. Circle 460 on reader service card.

SUITABILITY TO TASK	
NEC ProSera SH	
Fault tolerance	Fair
Management/configuration	Good
Performance	Fair
Security/expandability	Fair

Unisys PC Division

Aquanta QS/6

Very few server vendors can claim to provide worldwide service and support, which is a key selling point for Unisys machines. The latest Intel-based server from Unisys, the \$33,600 (street) Aquanta QS/6, contains some innovative features and provides great expandability, but its low performance scores are difficult to overlook. Unisys implements an ALR motherboard and chassis in the Aquanta; we also review the ALR Revolution Quad6 6200/512 server in this roundup.

Unfortunately, the Aquanta QS/6, using four 200-MHz Pentium Pro CPUs with 512K of L2 cache, had the roundup's worst performance. In fact, with four CPUs, the unit performed on a par with others running three CPUs. Scaling was also a problem: With 24 or more clients, a four-way Aquanta posted throughput scores only slightly better than its three-way results.

The motherboard has all four processors on the floor rather than on add-in cards, which lets you upgrade from a single-CPU to a multiple-CPU configuration by adding a CPU and a Unisys voltage regulator module. The unit uses Intel's 450GX chip set, which allows for seven PCI slots; a bridge chip allows for the addition of seven bus-mastering EISA slots. (A shared PCI/EISA slot is also present.)

System ECC RAM resides on an add-in card and is expandable to 2GB via 128MB SIMMs. Unisys plans to push the memory maximum to 4GB with a new DIMM card (when 256MB DIMMs are available). The card, however, hangs upside down inside the case; you must remove it to service system memory.

The disk subsystem is driven by an AMI MegaRAID Ultra SCSI controller, which supports RAID Levels 0, 1, 3, 4, and 5. This controller features 8MB of cache and three SCSI channels, each of which can support 15 devices. The unit includes five hot-swappable drive cases, each of which can house three 3.5-inch hard disks. The Aquanta also includes four 3Com Fast EtherLink 10/100-Mbps PCI Ethernet adapters and two redundant auto-switching 575-watt power supplies.

Sensors on the motherboard and on Intel's LANdesk card provide server management. A separate processor on the

motherboard collects statistics from these sensors and from the system's BIOS. The dLux Command Display, an LCD touch screen on the server's front panel, can display these statistics. The system sounds alarms if the service panel is left open, if the fans break, or if a memory error occurs.

Intel's LANdesk provides out-of-band management with its LANdesk Server Manager Pro module. The module is an ISA adapter featuring a 14.4-Kbps PC Card modem for remote dial-in. The LANdesk card also monitors internal



The Unisys Aquanta QS/6's vital signs are easily monitored via its dLux Command Display.

ambient temperature via a sensor wire that you can place in different locations in the server's case. System bus voltage and operating-system statistics are also monitored. You can set alarms to alert you if the server exceeds set parameters.

Unisys adds value to the Aquanta with the option of a rack-mount configuration; the vendor will also test hardware and software for compatibility at a customer's request. The Aquanta has the advantage of great expandability, but its lack of integration and unclear management strategy may deter some buyers.—CL □

Aquanta QS/6. Street price: \$33,600. Unisys PC Division, San Jose, CA; 888-278-2682; 408-434-2848; fax, 408-434-4844; www.pc.unisys.com. Circle 461 on reader service card.

SUITABILITY TO TASK	
Unisys Aquanta QS/6	
Fault tolerance	Fair
Management/configuration	Good
Performance	Fair
Security/expandability	Fair

N O W

**You Can Answer
Your Mother's Prayer.**

Introducing Connectix Color QuickCam™, the camera and software that lets you use your computer in fun ways at home, business and on the net. Send personalized cards. Add images to business reports. Videoconference with additional software. Spiff up your web site. Get Color QuickCam for under \$200*. Just plug it in, install the software and start taking brilliant color pictures and video on your computer.



CIRCLE 017 ON READER SERVICE CARD

Appear Nightly

In Her Living Room

In Living Color.



1-800-571-7558 or www.connectix.com

*Estimated retail price
after \$30 rebate

Now You Can With Color QuickCam

For Windows and Mac platforms. Available wherever computer products are sold.



PC Tech

THE DEFINITIVE GUIDE TO PC TECHNOLOGIES & TOOLS



IN THIS SECTION



TUTOR Jeff Prosize looks at a mixed bag of topics suggested by reader mail, including how to display the credit screens for some major applications, a fix for his CRC mini-utility, the new FAT32 file system for Windows 95, improved shell support for .ZIP files, and the absence of the System Monitor on some Windows 95 installations. *page 239*



INSIDE WINDOWS 95 Windows telephony and voice-enabled modems let your computer answer your phone, determine whether the call is an incoming fax, and, if the call isn't a fax, display information about who's calling. This technology also lets you maintain several different mailboxes and greetings. And with the right telephony products, you'll even be able to call your computer and have it read your e-mail to you. *page 241*



INTERNET TOOLS If you've been surfing the Web at all, you've probably typed the letters *http* more times than you care to think about. You may have known that the letters stand for "Hypertext Transfer Protocol." Now you can find out what that protocol is all about and how the Web uses it to work magic. *page 245*



UTILITIES Douglas Boling's MenuEdit is a Windows 95 utility that gives you power over the context menus that pop up when you right-click on a file's icon. MenuEdit lets you change the context menus for all files and for files of unknown type, as well as for individual file types. This in turn gives you power over what happens when you double-click on an icon. *page 249*

ALSO IN THIS ISSUE In PC Solutions, we discuss using Windows 95's ability to let you drop files onto batch file shortcuts, rooted Explorer views, a possible cause for monitor failure that you may not have considered, how to add viewers to OS/2 Warp's Web-Explorer, a way to get around a bug in WordPerfect that bloats files containing graphics each time you edit them, a couple of ways to toggle input mask settings in Microsoft Access, and more. *page 253*

Java Speed Trials

PC Magazine's Java performance tests reveal the strengths and flaws of today's Java environments.

By Richard V. Dragan and Larry Seltzer

In a little over a year, Sun Microsystems' Java has grown from an obscure research project into a core Internet development platform. The big breakthrough came with Netscape Navigator 2.0, the first major commercial browser to provide a Java virtual machine (VM). The recent 3.0 release of Microsoft Internet Explorer brings a Java VM to Microsoft's browser and a significant new Java platform to the Web. The latest 3.0 releases of both Navigator and Internet Explorer also include Java just-in-time compilers (JITs). Which browser has the most efficient VM for running Java programs? Which browser's JIT delivers the best code optimizations? Java's importance as a platform makes these questions far from academic.

This story introduces *PC Magazine's* JMark 1.0, a suite of 11 synthetic Java performance tests that address these questions

VISIO

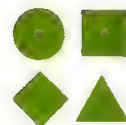
Graphics
technology

that will
help you work
smarter.

Look who's
using it

Try it.

See what it can
do for you.



It's a simple change *it only affects how you* think, plan and work

Chrysler Corporation is saving time by using Visio to track parts throughout the US, Europe, Mexico and Singapore. Other companies use it to save money or increase productivity. Companies such as Amoco, Hewlett-Packard and National Semiconductor.



Change is inevitable. But embrace it and your whole company can be more efficient, rise to new levels. Visio® allows you to make such a change. By using SmartShapes® technology you can create business diagrams that are both intuitive and intelligent. You'll be able to see information more clearly, think about it differently and understand it more completely. Try Visio and see for yourself. Call 800-24-VISIO, ext. B38 or visit the Visio Solutions Library™ at www.visio.com. For a corporate evaluation kit, call 800-VISIO-07.

Visualize your business™



Java Speed Trials

by simulating a number of important aspects of Java functionality. JMark includes Java ports of a number of classic benchmark test algorithms as well as tests designed to measure graphics performance in a GUI environment.

Using JMark, we tested Microsoft Internet Explorer 3.0 and Netscape Navigator 3.0, the latest releases of both browsers (for Navigator, we also tested the beta 5 release, because a bug in the final version made it impossible to generate a score in one of the tests). We also tested Netscape Navigator 2.0, which is still in wide use. Finally, we tested the VMs provided by three Java development tools: the Borland C++ 5.0 Add-On Environment, the Sun Java Development Kit (JDK) 1.0.2, and Symantec Café, Version 1.2.

Each of these browsers and tools includes a JIT except for Netscape Navigator 2.0 and the Sun JDK. We tested Internet Explorer 3.0 both with and without its JIT enabled. We did not test the built-in Java VM in OS/2 Warp, Version 4.0 (code-named Merlin), because the final release was not available in time for testing, but we will follow up when Merlin does ship. Neither did we test Microsoft Visual J++ 1.0, because it uses the same VM and JIT as Internet Explorer.

The most striking result is that Internet Explorer 3.0 is the fastest Java environment currently available: Netscape Navigator 3.0 is consistently slower than Internet Explorer, often significantly so. Not surprisingly, we also found that JITs can deliver dramatic speed increases in Java program execution—in some cases, up to 20 times as fast.

Finally, we uncovered some startling differences between Windows 95 and Windows NT as VM host platforms, with Windows NT turning out, in many cases, to be the faster of the two.

JAVA, JITs, AND GENERAL CONSIDERATIONS

Java is many things, including a C++-derived language and a VM that executes Java programs. The VM is a fictional processor that is emulated in software. The instructions,

been adding value to the VM, especially in the form of JITs.

Our JMark test suite shows that JITs make an enormous difference in Java performance. JITs are plugged into the Java VM, and when the VM is ready to execute a method in a class or object, it passes the bytecodes for that method to the JIT, which then compiles the bytecodes on the fly to native code (x86 code in the case of our test systems). Without a JIT, the Java VM must

Java Performance Test Results at a Glance



Internet Explorer 3.0 wins the Java speed trials by an impressive margin. Only the lightweight "applet viewers" in some development tools are faster.



Netscape Navigator 3.0's new JIT brings big Java performance gains over the older Navigator 2.0. But Navigator still lags behind Internet Explorer—in some cases, substantially. A few bugs in the final release kept us from running several of our tests reliably.



Windows NT turns out to be a surprisingly strong platform for running Java-enabled browsers. It generally kept up with Windows 95 and, in some cases, beat it by huge margins.



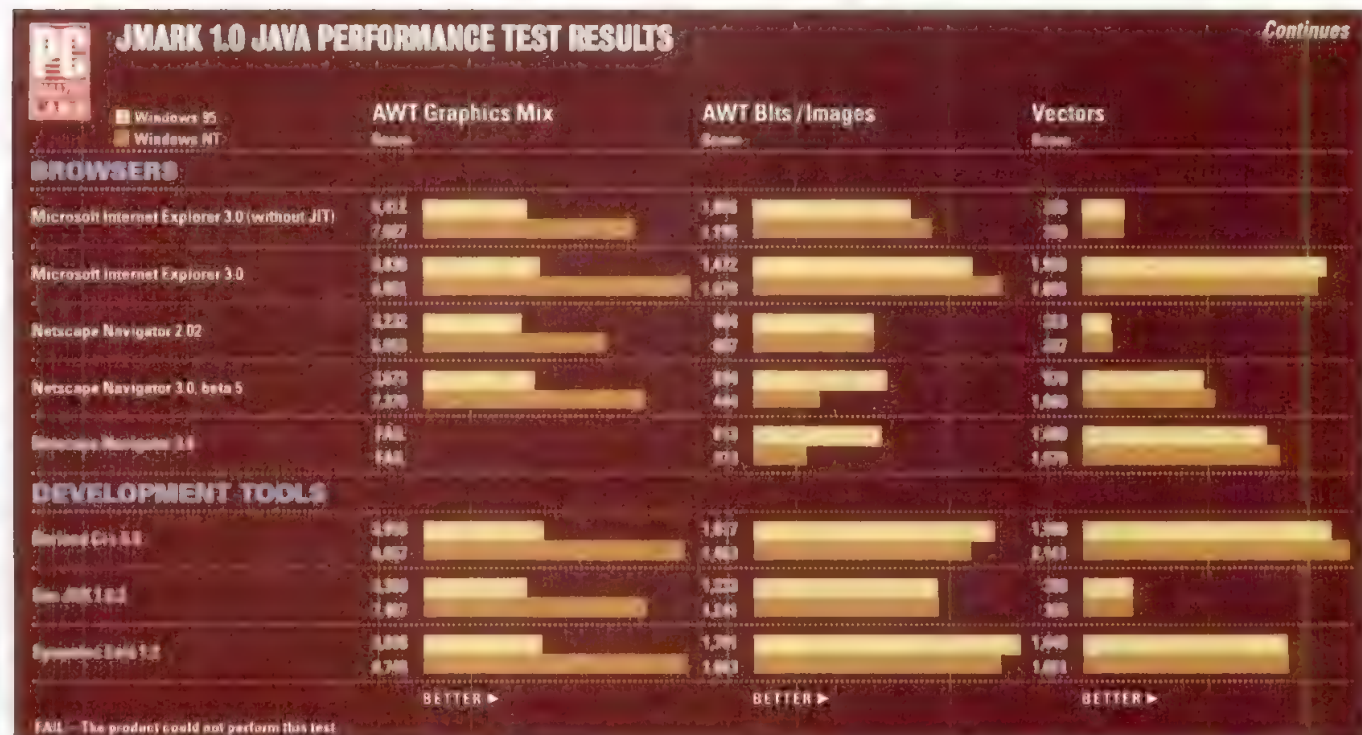
Overall, the Java VMs proved to be far less robust runtime environments than we expected and none has what it takes to host complex applications. We had to keep array and container sizes small in order for many of our tests to work at all.

called Java bytecodes, for that fictional processor are identical no matter which hardware or OS platform the VM is running on. As each bytecode comes along, the virtual machine reads it and executes the native instructions appropriate for the local environment. All current Java VMs derive from the Sun JDK, which Sun has licensed widely. Many licensees, especially Microsoft, have

interpret and execute each bytecode in succession—a much slower process.

In our tests, the JITs outperformed the non-JIT environments in almost all operations, usually by an order of magnitude. Because parts of the Java VM itself are written in Java, JITs can speed up more than just your application code.

Another important factor that can influ-



ence VM performance scores is the built-in security in Java. Java's Security Manager implements a series of security policies known collectively as a *sandbox*. The bytecode verifier, a second interpreter in addition to the execution bytecode interpreter, attempts to verify that no bytecodes violate security and Java language rules. When Java library classes, such as java.net and java.io, need to

ing (available through the java.net classes) is definitely used in many Java applets, but the speed of the network itself completely drowns out the speed differences between one java.net implementation and another.

THE TEST SUITE

The individual tests in the JMark suite target specific areas of Java functionality and are implemented in separate Java classes. All of the tests—with the exception of the Graphics Threads test—measure throughput, or the amount of work accomplished in a fixed period of time (30 seconds in all cases). In these tests, a higher score is better. The Graphics Threads test measures the amount of time needed to perform a set amount of work, so a lower score is better.

We built the performance test suite using Symantec Café 1.2. To help ensure that our test code did not contain tool-specific elements, we checked that the code would also compile correctly under the Sun JDK 1.0.2, the Borland C++ 5.0 Add-On Environment, and Microsoft Visual J++ 1.0, beta 2. The JMark suite runs as a single applet and requires HTML viewing capability, whether in a browser or, as was the case with the programming tools we tested, in an applet viewer. An applet viewer is designed to let developers view the output of their Java code quickly. It is typically much simpler than a full-fledged Java-enabled browser, which performs many other functions.

We ran all tests on a Micron Millennia with a Pentium/166 CPU, 32MB of RAM, an ATI

Mach 64 graphics card, and a Conner 2GB SCSI hard disk. We ran all tests three times for every product, rebooting the machine between runs. The published results represent the average of these three runs. Each platform was tested under both Windows 95 and Windows NT 4.0.

AWT GRAPHICS MIX

The AWT Graphics Mix test exercises the APIs of the Java Abstract Windowing Toolkit (AWT) Graphics class. This test performs a variety of graphics operations sequentially, including drawing lines, rectangles, rounded rectangles, ellipses, polygons, and text in different fonts. Where appropriate, these shapes are first drawn using borders only, then as filled-in areas, and finally in 3-D versions with raised edges. These permutations correspond to the capabilities of the Graphics class API methods.

In order to ensure that this test is not a test of random number generation, an array of 500 semirandom points and an array of 16 colors are generated before the test begins. These points and colors are used to render the drawing on the screen into a fixed window size as quickly as possible. The window size is defined as 740 by 400 pixels, which we found fit comfortably into all of the tested browsers and applet viewers when running at a screen resolution of 800 by 600 pixels.

ANALYSIS

This test demonstrates an interesting characteristic of the Java environment, the implementation of graphics operations largely in

Different VMs can have sandboxes and bytecode verifiers of varying aggressiveness, something that can have a significant impact on performance.

access some system or network resource, they often check with the Security Manager to see if the resource is accessible to them.

Different VMs can have sandboxes and bytecode verifiers of varying aggressiveness, something that can have a significant impact on performance. Our tests do not specifically measure how aggressive Java VM security is, and users may well be justified in making trade-offs in performance in order to gain more effective security.

Some Java features are not tested by the current version of JMark. The two most important are Java's I/O and network features. I/O (available via the java.io classes) is widely avoided by Java developers, because nearly all of its features are disallowed by Netscape Navigator for security reasons. The principal implication of this is that it isn't possible to read and write files in a Java program under Navigator. Network-

PERFORMANCE TEST RESULTS

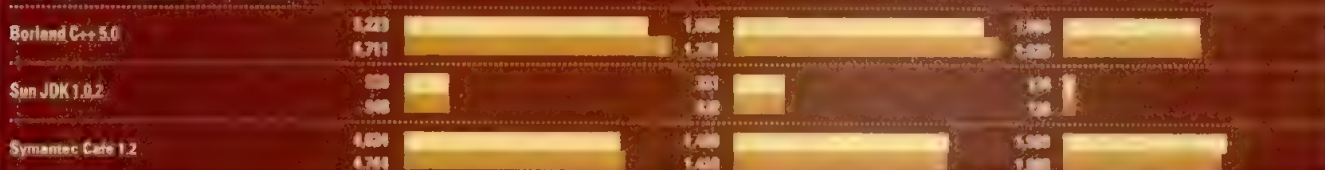
Continues

■ Windows 95
■ Windows NT

BROWSERS



DEVELOPMENT TOOLS



native code, in what is known as peer code (the Win32 peer, in our case). Because of this characteristic, we expected to see much less performance improvement here from a JIT than we expected in other tests.

Our hypotheses were confirmed. The difference in performance between products is not trivial, but it pales in comparison with the differences we saw in data-manipulation- and computation-intensive tests such as Quick Sort and Fast Fourier Transform. This is especially evident under Windows 95, probably because the graphics subsystem in Windows 95 is much slower than that in Windows NT. The test spends a greater percentage of time in the GDI subsystem and the Win32 peer code, which are common among the browsers. Under Windows NT, the GDI itself is much faster, giving the other components of the test suite, which benefit from a JIT, a greater impact.

The performance differences between Windows 95 and NT may also be attributable to Windows NT's superior handling of multiple threads. The AWT Graphics Mix test itself does not spin off threads, but the Java VM itself is probably running several already, for garbage collection and other operations. Portions of these VM functions themselves may be written in Java, so even more JIT-enhanceable code would be executed in the test.

The Java VM in Netscape Navigator 3.0 locked up after one pass of the operations in this test, apparently due to a bug in the implementations of the drawPolygon() and fillPolygon() methods.

AWT BLTS AND IMAGES

Many Java applets today are small animations that run in a portion of a Web page. The goal of the AWT Blts and Images test is to measure the speed of bit-block transfers (blts)—the type of transfers used in animations—of graphics data on-screen. This test uses two AWT Graphics object methods: drawImage() and copyArea(). The first call is used to display two .GIF images, one 36 by 40 pixels and the other 108 by 120 pixels. These images are first loaded without being timed. They are then bit-block transferred to the screen as quickly as possible. In between these image draws, the test makes calls to the AWT Graphics object's copyArea() method, which moves small areas of the screen around, producing a scrambling effect. Again, an array of semirandom numbers are used for the coordinates. Both the calls in the AWT Blts and Images test involve very little calculation; instead, they are largely tied to video performance. Most of these tests' work is done by the Win32 native operating system and the graphics hardware.

ANALYSIS

The AWT Blts and Images test also shows Netscape Navigator, in all its versions, in its worst light. Navigator fares particularly poorly under Windows NT, with Internet Explorer 3.0 performing over four times as fast as Navigator 3.0. Surprisingly, under Windows NT the older Navigator 2.0 is more than twice as fast as Navigator 3.0. Results under Windows

95 and Windows NT were much closer than in the AWT Graphics Mix test, indicating that blt operations under Windows NT are not as well optimized as more complicated graphics drawing operations are.

VECTORS, HASH TABLE, STACK

The next three tests—Vectors, Hash Table, and Stack—measure the performance of several of the Java container classes. Containers,



The performance differences between Windows 95 and Windows NT may be partially attributable to Windows NT's superior handling of multiple threads.

which are part of the java.util package, provide powerful and simple access to common data structures.

The Vectors test exercises the functionality of the Vector container class. This test first adds 100 randomly generated strings of 30 characters each to a Vector object. (The random strings are generated before timing begins.) This test searches for and verifies that each element in the array is present, removes every fourth element, then empties the container. The process is repeated for 100 Integer objects using the same sequence of operations.

The next container test is the Hash Table test, which makes use of the Java Hash-table container utility class. In general, Hashtable objects allow Java programmers to store associations or maps of pairs of values. Each element in the container consists of one variable, the *key*, which is mapped to another variable, the *value*. In the code



for this test, we map 100 Integer keys to 100 String values that consist of 30 characters each. Once the elements are added, we search for every fourth key in the container, then for every fourth value. Last, a quarter of the elements in the Hashtable are removed.

The Stack test is similar to the other container class tests, but it works with the Java Stack container class, which, like standard stacks, stores values in a last-in/first-out (LIFO) order. First, we push 100 Strings (each with 30 randomly generated characters) onto this stack, verify that the elements have been added, and then pop off these values. The process is then repeated for 100 Integer objects.

ANALYSIS

Vectors, Hash Table, and Stack are the first tests where we begin to see the enormous impact a JIT can have on Java performance. In all of these tests, the slowest JIT environment (Netscape Navigator 3.0, beta 5) is still over twice as fast as the fastest non-JIT environment (the Sun JDK). The Borland JIT seems to be particularly well optimized in these operations: It won the Vectors and Hash Table tests hands down and more or less tied with Internet Explorer 3.0 on the Stack test. Internet Explorer 3.0 performed respectably, especially on the Stack test, but it didn't dominate this test class the way it did others. Borland's and Symantec's compiler optimizations are clearly very strong contenders.

The defining characteristic of these tests is the involvement of adding data to and retrieving it from a series of complex data

structures. It's impossible to confirm exactly what optimization JIT brings that is responsible for performance differences on such a test, because the native code emitted by a JIT is inaccessible at a user level. Still, differences in register allocation schemes could explain the differences. Comparing these results with the Sort test results indicates that Borland, Microsoft, and Symantec have fun-

Vectors, Hash Table, and Stack are the first tests where we begin to see the enormous impact a JIT can have on Java performance.

damentally different optimization priorities.

Why did Netscape, which licenses Borland's JIT, lag on these tests, especially on the Hash Table test? We suspect that Navigator's very aggressive "sandbox" security and bytecode verifier slow down performance. But because JITs are supposed to cache compiled methods so that they need not be recompiled, security could only be a problem if this test were actually defeating this caching.

BUBBLE SORT, QUICK SORT, TOWERS OF HANOI

The next three tests were ported from the Stanford Unix benchmark tests, a public-domain test suite that measures multitasking—work done by processes or threads running different algorithms concurrently. Here, we ported individual tests that, in their original versions, would have executed as a single thread among many.

The first implements the well-known Bub-

ble Sort algorithm, which repeatedly swaps out adjacent out-of-order elements in an array of integers until an entire array is sorted. We used an array of 300 elements, reduced from the 20,000 in the original Unix version, because the larger array crippled most of the Java platforms tested here. (We also found that using very large container sizes crippled several of the implementations of

Java we tested. Clearly, Java platforms have a way to go before they will handle the large array and container sizes we expect to be able to use in established programming languages like C++ or

Smalltalk.) Note that in this case, the generation of the random values for each pass of each array is part of the timed test.

The Quick Sort algorithm used in the next test offers much faster sorting performance on a given array of integers than the Bubble Sort method. Our results show that several JIT compilers were able to optimize the Quick Sort test quite successfully.

The Towers of Hanoi test, also based on the Stanford Unix test suite, simulates the solution of a classic problem: how to move disks arranged largest to smallest from a first pile, to a second, and then to a third in such a way that only smaller disks are placed on larger ones. The moves are executed one at a time. Our implementation uses 14 disks and involves over 16,000 moves in an integer array of 3,000 elements. The recursive nature of this algorithm opens up the possibility of certain optimizations.

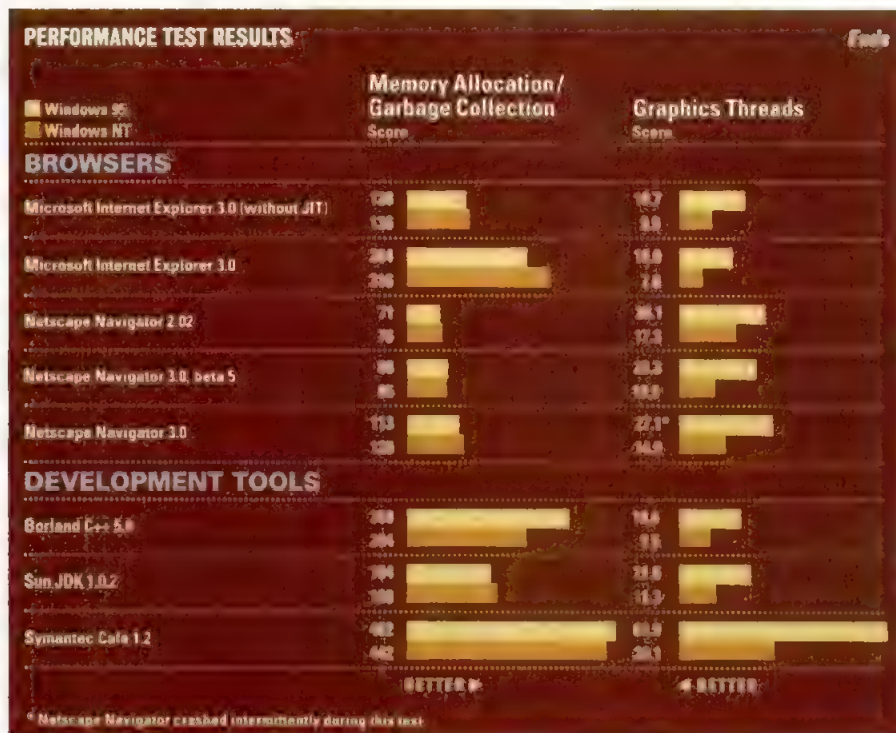
ANALYSIS

Internet Explorer 3.0 won all three of these tests by large margins on both Windows 95 and Windows NT. All three tests use conventional, popular algorithms, so the optimizations we uncovered are likely to be encountered by real users.

Quick Sort and Bubble Sort are straight sorting algorithms; Towers of Hanoi has the characteristics of a sorting algorithm, although it is actually a classic exercise in data-structure manipulation and recursion. Internet Explorer's commanding lead in the recursive Quick Sort led us to speculate that Microsoft must be implementing some sort of recursion optimization, specifically tail recursion; the company itself suggested that register optimizations in array handling could be responsible. The Towers of Hanoi and Bubble Sort tests show immense differences between JIT and non-JIT environments: In Internet Explorer, for example, enabling the JIT sped up the Towers of Hanoi test by a factor of almost 20.

THE FAST FOURIER TRANSFORM

The Fast Fourier Transform test, also derived from Stanford Unix benchmark tests, simulates a floating-point-intensive matrix



"I conquered software piracy!"

It's easy with the new SentinelWizard GUI

If you sell software without protection, you're losing sales and revenue to piracy. The illegal distribution and use of software is the greatest threat to your company's success.

The most advanced protection is now the easiest to implement. Today, Sentinel features the SentinelWizard™ GUI. This breakthrough tool guides you quickly and easily through the implementation process.

Fight back! Conquer piracy and ensure your revenue with Sentinel®, from Rainbow. It's the world's #1 software protection solution.

Don't wait - conquer piracy today! Call now and order your Sentinel Developer's Kit.

1-800-705-5552



Visit our web site
www.rnbo.com

SENTINEL
Software Protection

Ask us about SentinelLM™ - the new software-based Network License Manager

RAINBOW 50 Technology Drive, Irvine, California 92618, U.S.A.
Tel: (714) 450-7300 ■ Fax: (714) 450-7450 ■ Distributors worldwide
©1996 Rainbow Technologies, Inc. Sentinel, SentinelLM and SentinelWizard are trademarks of Rainbow Technologies. All other product names are property of their respective owners.
CIRCLE 007 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)



It's cutting edge...It's interactive...

and every PC Magazine reader should have it!



**GET 4
QUARTERLY RELEASES FOR \$49.95
— AND SAVE 30%!**

It's PC Magazine CD!

- Access the past 12 months' worth of articles, tips and utilities from *PC Magazine*
- Download the most recent WinBench and Winstone performance tests
- Get informative, interactive demos of new products, and much more!

Just call **1-800-335-1195** to get this offer or visit our special online order page at <http://www.pcmagcd.com/deals>

Please allow 60 days for delivery. Send payment in U.S. funds only. PC MAGAZINE CD is \$72 in Canada (includes Canadian GST and shipping charges); US\$99 for all other countries.



SYSTEM REQUIREMENTS: 486 or higher PC-compatible system, Windows® 3.1 or better, 8MB RAM, 256-color display, double-speed CD-ROM drive, Windows-compatible soundcard recommended for some functions.

PO Box 59494 • Boulder, CO 80323-9494 • <http://www.pcmagcd.com>

*This
won't*

Efficiency. It's what you expect from yourself. It's what you should expect from your hotel. At Sheraton Hotels, we have the experience to accommodate your every need. From the quickness of ExpressPassSM Check-in to the convenience of an in-room iron and coffemaker. Call your travel professional or 1-800-325-3535. If you prefer, you can make reservations on-line when you visit our Web site at <http://www.sheraton.com>.
OUR WORLD REVOLVES AROUND YOU.

*take
a
minute.*



ExpressPassSM Check-in



Sheraton
HOTELS & RESORTS

ITT

Rewards add up with ITT Sheraton and the American Express[®] Card. With the Membership RewardsSM Program, purchases made with American Express[®] Cards enrolled in the program earn points towards free travel, merchandise and more. Call 1-800-AXP-EARN to enroll now.



Cards

CIRCLE 250 ON READER SERVICE CARD

© 1996 ITT Sheraton Corporation.

Just a few of the ITT Sheraton Hotels and Resorts in North America

Alabama

Sheraton Civic Center/Birmingham
Sheraton Perimeter Park South/Birmingham

Connecticut

Sheraton Bradley Airport
Sheraton Hartford
Sheraton Stamford

Delaware

Sheraton Suites Wilmington

Washington, D.C. area

Sheraton Suites Alexandria
The Carlton
Sheraton City Centre
Sheraton Crystal City/Arlington
Sheraton National/Arlington
Sheraton Premiere/Tysons Corner
Sheraton Reston
Sheraton Washington

Florida

Sheraton Bal Harbour
Sheraton Biscayne Bay/Miami
Sheraton Ft. Lauderdale Airport
Sheraton Harbor Place/Ft. Myers
Sheraton Key Largo
Sheraton Key West
Sheraton Gateway/Miami Int'l. Airport
Sheraton Suites Plantation
Sheraton Sand Key
Sheraton Grand Tampa Westshore
Walt Disney World Dolphin
Sheraton World/Orlando
Sheraton Yankee Trader/Ft. Lauderdale

Georgia

Sheraton Gateway Atlanta Airport
Sheraton Colony Square/Atlanta
Sheraton Suites Galleria/Atlanta

Maryland

Sheraton Baltimore North
Sheraton Inner Harbor/Baltimore
Sheraton Int'l. BWI

Massachusetts

Sheraton Boston Hotel & Towers
Sheraton Commander/Cambridge
Sheraton Tara Newton
Sheraton Springfield

New Hampshire

Sheraton Tara Nashua

New Jersey

Sheraton Atlantic City West
Sheraton Crossroads/Mahwah
Sheraton Meadowlands/East Rutherford
Sheraton Tara Parsippany

New York

Sheraton Manhattan
Sheraton New York Hotel & Towers
Sheraton Park Avenue
Sheraton Saratoga Springs
Sheraton University/Syracuse

North Carolina

Sheraton Charlotte Airport

Ohio

Sheraton Cleveland Airport
Sheraton Cleveland City Centre
Sheraton Suites Columbus

Pennsylvania

Sheraton Bucks County
Sheraton Great Valley
Sheraton Society Hill/Philadelphia
Sheraton Station Square/Pittsburgh
Sheraton University/Philadelphia
Sheraton Valley Forge

South Carolina

Sheraton Charleston
Sheraton Columbia

Tennessee

Sheraton Music City/Nashville

Vermont

Sheraton Burlington

Virginia

Sheraton Oceanfront

operation from the world of physics. This test is an exercise in floating-point calculations and also uses complex arithmetic and heavy array manipulation. Instead of a custom Complex Number class, we broke out the real and imaginary components of each element in each matrix into separate arrays. This was another concession to the limits of the current Java implementations, which would not let us create 300 custom objects in a single array. Except for this change, and for a reduction of the array size from 2,000 to 300 elements, the basic algorithm itself was left intact.

ANALYSIS

This is the only test in the suite that uses a significant amount of complex math. Not surprisingly, JITs make a large performance

The ease with which multiple threads can be implemented in Java suggests that developers will eventually take advantage of them. They should.

difference in this arena: The fastest non-JIT environment is only a tenth as fast as the slowest JIT environment. Once again, Internet Explorer has a significant lead, with all other JIT environments packed closely together.

MEMORY ALLOCATION/GARBAGE COLLECTION

The Memory Allocation test measures two characteristics of Java platforms: the speed of memory allocation and the aggressiveness of garbage-collection algorithms. For this test, arrays of 500 elements of the Java primitive types—including int, float, double, and char—are allocated, as well as their equivalents in the java.lang package: Integer, Float, Double, and String. For good measure, we also added allocations for two AWT classes, Buttons and Panels. After each array is allocated, it goes out of scope, making it a candidate for Java's garbage collector. Although this test does not appear to invoke much garbage collection, it does point out the raw speed of allocation.

ANALYSIS

This test indicates the environment's performance at allocating and garbage-collecting memory. Unfortunately, the two operations are difficult to separate. This is certainly a test of memory allocation, a crucial function in many programs that is tied in to the VM's efficiency in working with the operating system. The extent to which it is a test of the speed of garbage collection is debatable. Different garbage collection schemes can be more or less aggressive, meaning that they can kick in more or less often and collect more or less memory. There are also different ways the system can deal with the frag-

mentation of memory that occurs in garbage collection. Again, Internet Explorer was the clear leader.

GRAPHICS THREADS

The last part of the test suite, the Graphics Threads test, is different because it measures how long it takes to do a fixed amount of work rather than measuring throughput for a fixed unit of time. In this test, a lower score indicates a better result. This test starts 16 worker threads running concurrently. Each one draws semirandom graphics in its own AWT Panel on-screen, in a 100- by 100-pixel area. Under Windows 95 and NT, it is now routine for Java threads to be run as native Win32 operating system threads, which, in theory, should be scheduled by the OS itself. The threads are in contention, not only for

CPU attention but also for access to the graphics on-screen, which must be synchronized in order for the threads draw. Not surprisingly, we saw much

better results across the board under Windows NT 4.0, which offers more robust scheduling and synchronization than does Windows 95.

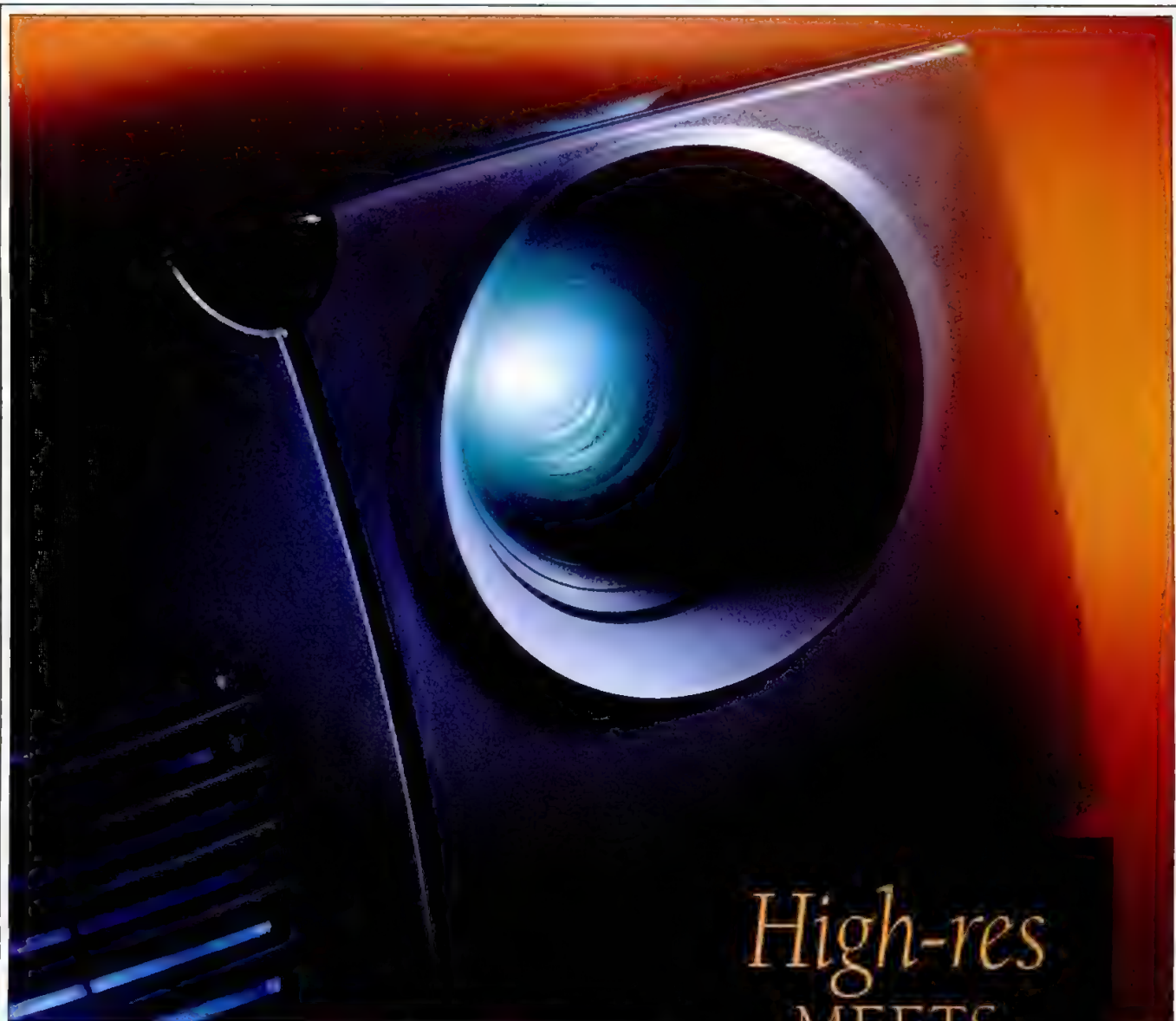
ANALYSIS

Java comes with classes for implementing multiple threads; the ease with which this works in Java suggests that developers will actually take advantage of these classes. They should, especially on Windows NT. What we witness through Windows NT's besting of 95 is Windows 95's infamous Win16Mutex in action. Win16Mutex is a mechanism for ensuring that only one thread in the system at a time enters the non-reentrant 16-bit portions of Windows 95's kernel. Under Windows 95, the threads fall completely out of synch with one another, some ending long before others do. Under Windows NT, the 16 threads all proceed in lockstep and finish in synch.

Beyond the differences between the operating systems, there are clear differences between the Java implementations. Again, Microsoft's browser has the best one. Even without its JIT, Internet Explorer outperformed all but Borland C++. Netscape Navigator, in its various versions, was a middling to poor performer, but truly poor performance on the Graphics Threads test came from Symantec Café.

Overall, as Java platforms mature, we can expect more VM optimizations and better just-in-time compilation. As Java applets widen their repertoires to include data-access and general-purpose calculations, the benefits of JIT-enabled speed will become even more appealing.

All of the browser environments require further optimization for hosting applications with large, complex data structures. We hope that our results will help spur vendors to make those changes. □



High-res MEETS Hi-Fi.

Introducing the only projector combining exceptionally smooth SVGA graphics and amazing shake-the-table sound—the new LitePro® 620.

For starters, it's got Digital Light Processing™, so you get unsurpassed, film-quality graphics and video. And it's got a better audio system than most cars, featuring four high-powered JBL® speakers.

Plus, it projects a super-bright 450 lumens in full color (an eye-popping 1400 lumens in Greyscale Mode). And since In Focus projectors are easier to connect and use, more people have bought them than any other.

So check out the new In Focus LitePro 620 today. It's where high-res meets hi-fi.



InFocus®
S Y S T E M S

Take a test drive: 1-800-294-6400
or <http://www.infs.com>



CIRCLE 390 ON READER SERVICE CARD
OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)



By Jeff Prosis

From Easter Eggs to System Monitor

Responding to feedback from readers like you.

Summer is over, and now it's time to clean out the attic by responding to some of your questions and comments that have come up in recent months. It's always interesting to hear from you about the subjects we cover here, so don't hesitate to make your opinions known. You'll find instructions for contacting me at the end of this column.

EASTER EGG UPDATE

"Windows 95 Secrets" (December 19, 1995; all articles mentioned here are from the Tutor column unless otherwise noted) described how to display the Windows 95 Easter egg, an animated credits screen that lists the names of everyone on the Windows 95 development team. That column generated a small flood of e-mail, much of it taking Microsoft to task for using up precious disk space with nonessential extras.

Want to see some imaginative Easter eggs in other Microsoft products? Follow these steps to display the Easter egg hidden in Microsoft Excel for Windows 95:

1. Start Excel and create a new worksheet.
2. Select the entire 95th row of the spreadsheet and tab to column B.
3. Select About Microsoft Excel from the Help menu to display Excel's About dialog.
4. Click on the dialog's Tech Support button with the Ctrl and Shift keys held down.

Excel will respond by displaying the window pictured in Figure 1. "Hall of Tortured Souls" is a Doom-like world, and you move around in it with the arrow keys. Move forward and ascend the staircase in front of you to view the names of the people on the development team. Turn around 180 degrees, proceed to the blank wall at the far end of the hall, and type EXCELKFA to reveal a hidden passageway containing additional goodies. Keep exploring—you never know what kinds of treasures you might find.

If you're into the occult, you'll enjoy the Easter egg hidden in Microsoft Access for Windows 95. Here's how to bring it to life:

1. Start Access and create a new database.

2. Create a do-nothing macro and name it Magic Eight Ball.

3. Drag the macro onto a toolbar so Access will create a toolbar button for it.

4. Right-click on the toolbar button and select Customize from the context menu.

5. Right-click on the button again and select Choose Button Image from the context menu.

6. Select the eight ball in the Choose Button Image dialog. Then finish by clicking on OK and Close.

Now verbally ask your computer a question that has a yes or no answer (for example, "Will my boss ever let me replace this crummy 486 with a Pentium?") and click on the eight-ball button on the toolbar. The magic eight ball will answer your question.

Visual C++ 4.0 features a "flight simulator"

cated at weber.u.washington.edu/~davidn/eggframe.html. There, you'll find a long list of major application programs and instructions for displaying their Easter eggs. Not all of the Easter eggs listed there are credits screens; some are undocumented cheat keys in popular games such as Duke Nukem 3D and Descent. Who said programmers are a boring lot?

A FIX FOR CRC.COM

"Digital Signatures: How They Work" (April 9, 1996), featured CRC.COM, a small command line utility that generates 32-bit CRC (cyclical redundancy check) values from the contents of files. CRC values are useful for verifying that files have been downloaded correctly and for detecting changes to those files after you have downloaded them. Changing one bit value anywhere in a file is virtually guaranteed to change the file's CRC value.

Unfortunately, the original version of CRC.COM had a bug in it that sometimes caused zeros to be dropped from the output. The CRC value 455A096E, for example, was erroneously reported as 455A96E. We posted a corrected version of the program in the Tutor library (lib 3) of PC MagNet's UTIL-FORUM in April.

How do you know if you have the old version? Simple: Run CRC.COM on itself by going to the directory where it's stored and typing



FIGURE 1: Excel 95's Hall of Tortured Souls.

Easter egg that lets you do an animated fly-over of a virtual landscape that contains photographs of the developers. To display it, make sure the Visual C++ CD is in your PC's CD-ROM drive. Then start Visual C++, select About Developer Studio from the Help menu, and double-click the left mouse button anywhere in the About box while holding down the Ctrl key. Use the arrow keys to zoom up, down, left, and right while you're in flight.

Microsoft programmers are particularly famous for embedding Easter eggs in their code, but the practice is by no means unique to them. To see what I mean, point your Web browser to the Easter Egg Archive page, lo-

CRC CRC.COM

at the DOS command prompt. If the reported CRC value is 86C237FA, you have the old version. The CRC value for the corrected version of CRC.COM is E1003D3A.

FILE SYSTEM UPDATE

"Drive Size vs. Storage Efficiency" (June 27, 1995) and "Can VFAT Handle Large Disks?" (October 10, 1995) described one big reason why Windows 95's VFAT file system is a poor manager of large hard-disk partitions. As the volume size grows, the cluster size grows, too, and larger clusters increase the amount of wasted disk space at the end of every file.

REGEDIT4

```
[HKEY_CLASSES_ROOT\.zip]
@="zipfile"
```

```
[HKEY_CLASSES_ROOT\.zip\ShellNew]
"FileName"="Blank.zip"
```

```
[HKEY_CLASSES_ROOT\zipfile]
@="PKZIP Archive"
```

```
[HKEY_CLASSES_ROOT\zipfile\shell\open\command]
@="c:\dosutils\pkzip.exe -v %1"
```

FIGURE 2: REG file for adding a PKZIP Archive command to the shell's New menu.

It's an ill-kept secret that Microsoft has been working on a FAT32 file system that keeps the cluster size manageable by expanding the size of individual FAT entries from 16 to 32 bits. Once FAT32 becomes a reality, the cluster size will no longer be driven by the volume size and the system will be able to handle 2GB volumes as efficiently as it handles small hard disks today. It's possible that FAT32 will be available on new PCs that have Windows 95 preinstalled by the time you read this, but as of late spring, when this column was written, it was unclear when an upgrade to FAT32 would be available for older systems running Windows 95. Watch this column for further details about the new file system as information becomes available.

IMPROVED SHELL SUPPORT FOR .ZIP FILES

Several readers have written in recent months asking whether it's possible to modify the ZipDrop utility I wrote for "Turn Zip Files into Drop Targets" (Utilities, January 23, 1996), so that a brand-new .ZIP file can be created through drag-and-drop. The short answer is no, because the .ZIP file has to exist before ZipDrop can add files to it. But there's an elegant workaround that you can employ to avoid having to use PKZIP to create .ZIP files manually so they can serve as drop targets. Here's what to do:

1. Go to the ShellNew folder in the directory in which Windows 95 is installed and create a .ZIP file named Blank.zip containing just one compressed file (any file will do). Now run PKZIP with a -D switch to delete the lone file from Blank.zip. If you use PKZIP 2.04g, the resulting .ZIP file will be 22 bytes long. Note: ShellNew is a hidden folder. You won't see it in Explorer unless you check "Show all files" on the View page of Explorer's Options property sheet, which you'll find in the View menu. In a DOS box, you can go directly to the folder by typing

```
CD \WINDOWS\SHELLNEW
```

at the command prompt—provided, of course, that the path to the directory in which Windows 95 is installed is \Windows and that the current drive is the drive on which that path resides.

2. Use Notepad or the text editor of your choice to create a text file containing the statements shown in Figure 2. Substitute the path to Pkzip.exe on your PC for "c:\dosutils" on the last line, making sure to replace each backslash in the path with a double backslash. Save the file and name it Zipfile.reg.

3. Go to the folder in which Zipfile.reg is stored and right-click on the Zipfile.reg icon. Then select

Merge from the file's context menu to merge the contents of the file into the Registry.

Once these steps are complete, you can create an empty .ZIP file on the desktop to serve as a drop target for ZipDrop by right-clicking the desktop and selecting New | PKZIP Archive from the context menu. To create a new .ZIP file in a file-system folder, right-click on the background of a folder window. As an added bonus, double-clicking on a .ZIP file icon will now open a DOS window and execute a PKZIP -V command to list the files stored in the archive.

What's the secret? The statements in Zipfile.reg add Registry entries instructing the shell to add "PKZIP Archive" to the New menu and, furthermore, to use Blank.zip as a template for newly created .ZIP files. When you select New | PKZIP Archive from the menu, the shell quietly creates a copy of Blank.zip in the target directory, names it New PKZIP Archive.zip, and gives you the opportunity to rename it. Zipfile.reg also adds an entry for an Open command to the Registry, because PKZIP Archive won't appear in the New menu unless Open is defined, too. Note that these Registry commands may conflict with commands added by commercial .ZIP file utilities. If you've installed PKZIP extensions other than PC Magazine's ZipView and ZipDrop, you may have to reinstall them to get them working again after merging the statements shown in Figure 2 into the Registry.

UNDOCUMENTED SYSTEM MONITOR

"Win 95's Virtual Memory Manager" (March 12, 1996) included a tutorial on using Windows 95's System Monitor utility to monitor memory usage. I received a number of e-mail messages from users complaining that System Monitor was nowhere to be found on their PCs or on the installation disks that came with Windows 95. Unknown to me at the time, System Monitor is only provided with the CD-ROM version of Windows 95. If you have the

floppy disk version, you can download System Monitor and other optional components provided on the Windows 95 CD, from Microsoft's Windows 95 Accessories Web site at www.microsoft.com/windows/software/accessories.htm. You can find other CD-ROM goodies at www.microsoft.com/windows/software/cdextras.htm.

A reader sent me a follow-up describing an undocumented method of getting System Monitor to report modem throughput. Our technical editor, Neil J. Rubenking, has already written about this previously unknown feature of System Monitor in his User-to-User column, but in case you missed it, here's a quick recapitulation of the steps required to activate it:

- Open Control Panel, double-click on the Modems icon, and click on the Properties button in the Modems Properties dialog.
- Click on the Connection tab in the property sheet and then click on the Advanced button on the Connection page.
- Check the Record a Log File box in the Advanced Connection Settings dialog. Back your way out of the dialogs and property sheets by clicking on OK/OK/Close.
- Establish a connection to a remote data source using a 32-bit communications program. Windows 95's HyperTerminal applet will do just fine.
- With the communications program still running, start System Monitor and select Add Item from the Edit menu. Under Category, there will be a new entry for your modem (for example, Intel 14.4EX). Click on that entry to highlight it and select Bytes Received/Sec and Bytes Sent/Sec from the list box on the right. Then click on OK, and two new graphs will appear charting modem throughput in bytes per second.

As far as I can tell, you have to remove the graphs from the System Monitor window and recreate them each time you start a new communications session in order to get accurate results. Maybe that's why Microsoft chose not to document this feature.

YOUR COMMENTS WELCOME

Do you have a question or comments regarding past Tutor columns? If so, I'd like to hear from you. If you have access to CompuServe, type GO ZNT:UTILFORUM to visit PC Magazine's Utilities/Tips Forum, and leave a message for me (user ID 72241.44) in that forum's Tutor section. From the Internet, send mail to 72241.44@compuserve.com. The subject matter selected for the Tutor column is partially driven by the input I receive from you, so don't be afraid to speak up. □

Jeff Proise is a contributing editor of PC Magazine and the author of Programming Windows 95 with MFC, published by Microsoft Press.



PC Tech/Inside Windows 95

By Barry Simon

Let Windows Answer the Phone

Voice-enabled modems, TAPI, and SVD bode powerful telephony.

Picture this: Your phone rings, but you've trained yourself not to answer it, because the computer processes incoming calls. First, the computer checks for a fax tone. If a tone is found, the call is automatically routed to your fax software.

Next, the computer grabs the incoming phone number using caller ID. It then checks your PIM to figure out who is calling, and if the computer fails to find the number there, it checks a CD-ROM containing a regional telephone directory.

It's just about the third ring and a dialog pops up telling you who is calling, if that has been determined. If the information's from your PIM, the whole record pops up. The dialog lets you leave the call unanswered, send it to voice mail, or pick it up using your computer microphone and speakers as a speakerphone. If you take no action, voice mail is automatically invoked.

And—most remarkably—you're doing this with your standard modem, without specialized, expensive hardware.

This fantasy involves bits and pieces of technology that aren't yet in place, but it's close to becoming a reality. The revolutionary replacement of specialized telephony hardware with off-the-shelf computer hardware that is already affecting midsize PBX systems has reached the low end, where it will impact SOHO and home users.

In this article, we'll take a look at the pieces that make up the telephony technology puzzle, from hardware features to the various APIs in Windows 95. Along the way, I'll also highlight a few pitfalls.

THE VOICE-ENABLED MODEM

Modem manufacturers have hit a brick wall with analog phone lines, which won't allow reliable data transmission at rates much above 28.8 Kbps (or, with very clean lines, 33.6 Kbps). Although there will likely be one more generation of modems (to create support for H.324 video compression), much of the focus of modem manufacturers will be in adding voice capabilities. And system manufacturers looking for something to distinguish them from the crowd will find this an attractive technology to offer. With the exception of the prices for modems with SVD features (discussed below),

this means that the current \$30 to \$50 premiums on fully voice-enabled modems will plummet in the next year, as economies of scale kick in and the technology itself matures.

Currently, voice-enabled modems offer one or more of the following features:

- **Audio telephony device:** Dials and answers the phone without initiating or attempting to initiate a data connection. Traditional modems can dial the phone, but they require you to switch off the modem before you can start talking.
- **Speakerphone:** Could be a headset or handset connected to your computer. The modem has an input/output jack or some other way to

- **Caller ID:** You can now buy this service, which transmits the telephone number of the calling party to you between the first and second rings, from most phone companies. You don't need a separate device to get caller ID from the phone line—with a voice-enabled modem, this information can be used by programs on the computer that make the right API calls.

- **Incoming call auto-detect:** Distinguishes between incoming fax and nonfax calls.

- **Simultaneous voice/data (SVD):** Provides the ability to send data over voice lines during a voice call or at least shift back and forth between voice and data within a single call.

A modem can call itself "voice enabled" even if it has only a subset of these properties. At one point in telephony's history, confusion abounded about the precise specs of these features, so software and hardware had to be carefully matched. Now, except for SVD, the features are standardized for most modems. To be sure that your modem will be able to use general-purpose software and not just the proprietary software that ships with it, you can confirm that your modem is implementing voice features under the UniModem/V spec (discussed below).

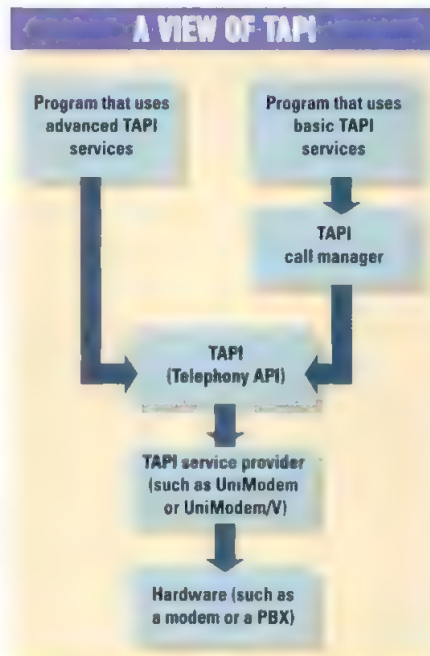


FIGURE 1: The scheme of Windows' Telephony Application Programming Interface (TAPI), a spec developed jointly by Intel and Microsoft.

connect to your sound card, or, like the Creative Labs Phone Blaster cards, the modem is a combined sound/modem card. You can then use the microphone and speakers you already have for your phone.

- **Telephone answering device (TAD):** Provides the ability to connect to voice mail software.

TAPI OVERVIEW

Underlying Windows' telephony capabilities is TAPI, the Telephony Application Programming Interface, a specification developed jointly by Intel and Microsoft. The overall scheme (see Figure 1) is similar to MAPI, the Messaging API discussed in this column in our issue of May 28, 1996. Since MAPI and TAPI are both part of Microsoft's WOSA (Windows Open Service Architecture), it is not surprising that similarities exist between the two.

MAPI relies on service providers (such as fax and Internet Mail) and a primary client (usually Microsoft Exchange Inbox). A program can call MAPI directly and set up a full-fledged MAPI session. Or a program—typically one with a Send item in its File Menu—can be MAPI-aware and make a simple call to the primary MAPI client.

Similarly, TAPI manipulates the "phone" through a set of service providers. For modems that use "plain old telephone ser-

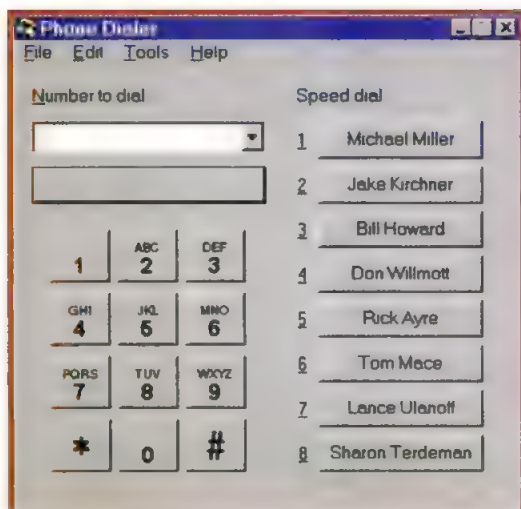


FIGURE 2: Windows 95 ships with Phone Dialer, which acts as a TAPI call manager.

vice" (or POTS, the name used in the communications industry for standard analog telephone lines), these service providers are also a part of Windows 95 and are called UniModem and UniModem/V. (The V stands for *voice*.)

Third parties can write their own service providers, as some makers of PBXs have done; Microsoft has also released a service provider for ISDN.

THE TAPI CALL MANAGER

Analogous to the primary MAPI client is the TAPI call manager. Programs can use any TAPI services or can use TAPI through the call manager. A program can interact with the call manager in one of two ways: it can either pass along a telephone number, which the call manager can call, or it can ask the call manager for your local phone number. The latter is useful if the program in question needs to know your area code. Windows ships with a call manager called Phone Dialer (see Figure 2), but you can replace it with another program. Microsoft Phone, for example, does exactly that. (For more details, see the sidebar "Microsoft Phone: Sophisticated Voice Mail.")

Since Windows 95 relies on its Registry for most system settings instead of on .INI files, you might expect that the call manager is registered in the Registry—but it isn't. In your Windows 95 directory, you'll find a file called *Telephon.ini* that has a section called [Hand-offPriorities] with an item named "Request-MakeCall." If you had installed Microsoft Phone, the entry might read

```
RequestMakeCall=C:\PROGRA~1\MSPHON~1
  ↳\MSPHON~1.EXE,DIALER.EXE
```

The first program after the equal sign is the call manager (in this case, Microsoft Phone),

but if that program cannot be located and if other programs are in the list, those other options are used instead. Here, for example, Phone Dialer would be used if Microsoft Phone has been moved or deleted.

By the way, if you've ever looked at the list of calling cards in the telephone location dialog (from Control Panel, call up Modems, hit Dialing Properties, and check the box labeled Dial using Calling Card to get to the list shown in Figure 3), this list is also stored in *Telephon.ini*, in the [Cards] section.

Programs can sidestep the call manager and directly make TAPI calls through the published API. Visual Basic programmers who want to access TAPI will want to look at customer controls that encapsulate TAPI. One set of such controls is Visual Voice, from Stylus Innovation (617-621-9545).

UNIMODEM

The TAPI service provider for POTS is called UniModem. It resides in two files in the system subdirectory of your Windows 95 directory, *Unimodem.tsp* and *Unimodem.vxd*. The filenames are the same whether you are using UniModem or UniModem/V (UniModem's voice-enhanced successor), but the dates and sizes are different. The original UniModem shipped with Windows 95; its files have the standard Windows 95 date of 7/11/95. These files total 70K. UniModem/V, which must be installed by a voice-enabled modem's setup program (or during the plug-and-play installation of its drivers), is

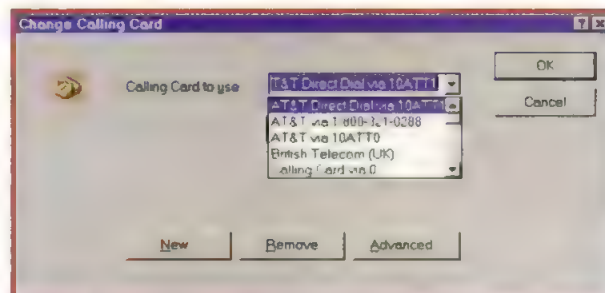


FIGURE 3: This list of calling cards in the telephone location dialog is stored in the [Cards] section of your *Telephon.ini* file.

dated 11/27/95 and totals 97K in size.

UniModem is patterned after the Windows printer driver model. Once, programs had to track specialized printer codes for dozens of printer models. Under Windows, however, the programs make calls to basic graphics commands and let the printer driver worry about the translation instead. Similarly, communications programs have had to track AT codes for scores of modems. Under TAPI/UniModem, the AT codes are

stored in the Windows 95 Registry in the following key:

```
HKEY_LOCAL_MACHINE\System\Current-
  ↳ControlSet\Services\Class\Modem
```

Under this key, you'll find subkeys with numbers (0000,0001, and so on) and subkeys for operations. For example, with the Supra 288i modem I used for testing, there is a subkey, *SpeakerPhoneEnable*, with the data pair 1="at#vls=6<cr>". A telephony program can find and use this information.

TAPI WOES

TAPI allows multiple 32-bit programs to share a single modem. For example, you could have Exchange Inbox monitoring a fax line or Microsoft Phone a telephone line, yet still be able to have ProComm use the phone line in order to dial out. But be aware that this capability holds true only if the communications program is 32-bit and understands and uses TAPI. If you run, say, an answering-machine program that monitors the phone line using TAPI, you should expect problems if you try to run Windows 3.1 and DOS communications programs.

For Windows 3.1 programs, you're out of luck—they won't be able to use the modem until you exit the program monitoring the line. My Windows 3.1 PIM (which hasn't been upgraded to Windows 95) no longer auto-dials for me unless I first exit Microsoft Phone.

Sometimes, if you have a dial-up Internet connection, you can reconfigure the communications program to use that connection, because, not surprisingly, Windows 95 Dial-Up Networking understands TAPI. For example, WinCIM 2.x is not TAPI-aware, so it won't dial with Microsoft Phone loaded, but it will work through an Internet connection using Dial-Up Networking.

There is a way for DOS programs to use a modem even though a TAPI-aware program is monitoring the line for incoming calls. Add the line

```
com1autoassign=2
```

to the [386Enh] section of your *System.ini* file. Note

that the line starts with *com*, not *comm*, and that the 1 after *com* stands for the comm port number used by the modem.

SIMULTANEOUS VOICE AND DATA

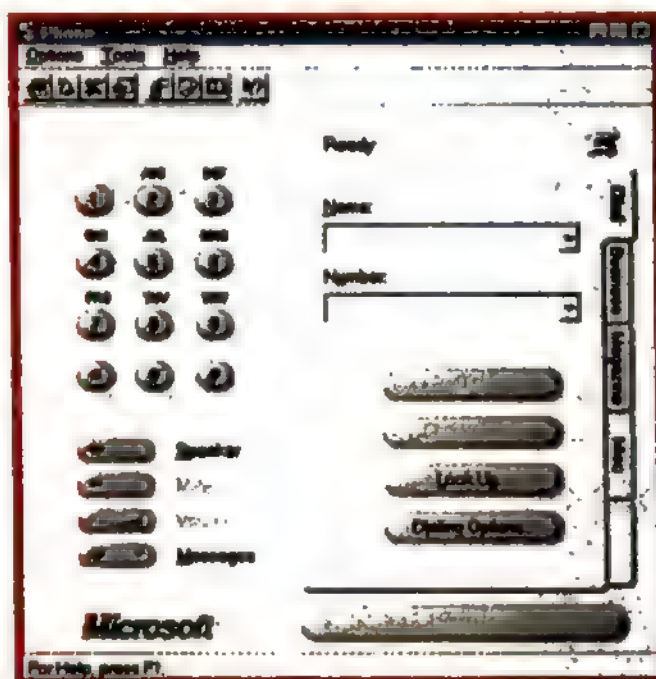
Another aspect of voice-enabled modems is the issue of being able to talk and send binary data during a single phone call. At the most basic level, you would be able to shift between voice and data transmissions, a useful function for online ordering, for instance, during

Microsoft Phone: Sophisticated Voice Mail

The Microsoft Phone Windows telephony software showcases the variety of functions a voice-enabled modem can have. For now, Phone is available not in the retail channel but bundled only with those voice modems whose manufacturers have licensed it. Among the modems that include Phone are the SupraFAXModem 288i PnP and the Creative Labs Phone Blaster 28.8 PnP.

The basic interface, shown in the screenshot, looks similar to Windows Dialer in that there is a push-button phone pad and speed-dialing entries. There are multiple tabs for speed-dial entries, and the program stores previous numbers that you've dialed in a drop-down list. Phone can also search your MAPI address book for numbers to match the names you type.

Where Phone goes beyond mere dialers is in the way it reacts to incoming calls, and in the Speaker and Messages functionalities. When a call comes in, Phone's look changes to show the incoming phone number, the name of the number's owner, and various response options, such as Answering or Screening the Call, or Taking a Message. Screening the Call lets you listen to the message coming in and answer it if you wish, and Taking a Message works in the background.



Microsoft Phone takes advantage of a variety of telephony options using voice-enabled modems.

If you have caller ID, Phone will display the incoming number, and if that number is in your MAPI address book, it will also display the name of the number's owner.

You can assign any .WAV file to your phone greeting, and you can maintain multiple greetings that change, depending on your schedule. Messages received are stored in Exchange Inbox. You can set up the program to have multiple mailboxes with an overall greeting ("Press 1 for Mailbox 1," and so on) and separate greetings for each mailbox. Mailboxes can also be set up to send faxes to a number the caller is asked to enter.

Mailboxes can be accessed by calling in, pressing the star key on a Touch-tone phone, and entering the password for the desired mailbox. The program includes Microsoft Voice, a text-to-speech module. When you phone in, Voice can read your Exchange e-mail, or it can fax the e-mail to a number you type into the phone. You can also configure Phone to call or page you whenever a new message arrives.

Once the computer has access to the voice stream from the outside, Microsoft Phone can make sophisticated voice mail systems just a matter of having the right software.—Barry Simon

which product information could be sent to you as data. VoiceView is a common spec for this switched mode. It is supported by many modems, although there have been reports of compatibility problems during sessions that involve modems from different manufacturers that use VoiceView.

More interesting but still in its early stages is SVD, which relies on the fact that voice doesn't require the full bandwidth of a phone line. Initially, the biggest market for SVD will be the gaming market, where cool interactive games will depend on the ability to yell "Die, dog!" into a headset as you are shooting down your opponent's plane on-screen.

In the longer term, you can expect technical-support staff to make heavy use of SVD: A support person could download your Autoexec.bat or look at your system directory just as you are describing the problems over the phone. You can also expect airline reservations and online banking and sales personnel to use it (if those industries don't turn first to SVD over the Internet).

SVD comes in analog and digital varieties: ASVD and DSVD, respectively. ASVD uses some voice-compression algorithms but still sends voice as an analog signal. DSVD encodes voice as a digital data stream. With either spec, special codecs are used to squeeze voice to roughly 8 Kbps, and the potential exists to use silence-detection technology to cut that rate down even more.

ASVD has the advantage of allowing music to be sent as part of the analog stream, because ASVD affords better fidelity than does on-the-fly digital conversion. At the present time, however, DSVD has a standards advantage. At this writing, the ITU was expected to approve a 28.8-Kbps DSVD specification (For more information, consult G.729 Annex A; you'll also see mention of V.70 and

V.75, the specifications for SVD handshaking). On the other hand, the only ITU-approved ASVD specification is for 14.4 Kbps. Discussions of a 28.8-Kbps ASVD spec are in the air but are not yet definitive.

DSVD modems have heftier premiums than

voice-enabling modems (the premiums for DSVD typically lie in the \$150 range), in part because the encoding requires extra computing power in the modem. (Most modems already have a digital signal processor (DSP); DSVD modems need a second DSP or a more powerful one than is used for non-DSVD modems.) DSVD is still in a growth phase. You should expect the potential for problems with communications between DSVD modems from different vendors. The wisest course is to be sure that the DSVD code resides in flash ROM that can be upgraded as the need arises. The price premiums on ASVD modems will be clear only when the actual modems appear this fall, but they should be lower than those for DSVD.

To add to the confusion, it may be that software SVD will make the wars among hardware specs irrelevant. Microsoft's NetMeeting program (for collaboration over the Internet), uses Digital SVD to allow voice contact. The voice channel requires 4.8 to 16 Kbps, depending on the level of quality desired.

Although the confluence of the voice telephone and the data modem hasn't gotten the attention other communications trends have, it will have a profound influence on how people interact in the near future. □

Barry Simon is a contributing editor of PC Magazine.

Very interesting but still in its early stages is SVD, which relies on the fact that voice doesn't require the full bandwidth of a phone line.

Top Ten Things To Do With Your Printer



- 10 Get a raise** – Impress your boss by turning Excel® spreadsheets into an easily handled budget booklet.
- 9 Find your own way** – Print your own custom trip books from map CD-ROMs.
- 8 Have fun** – Create personalized greeting cards from Word Pro® or any other word processor.
- 7 Be practical** – Turn online and CD-ROM documentation into easily handled double-sided manuals.
- 6 Take it with you** – Print your business letters and plans to fit into your organizer.
- 5 Print a best-seller** – Make a FileMaker® database of top selling products easy to handle by turning it into a booklet.
- 4 Get attention** – Print your next report as a booklet.
- 3 Be cool** – Turn your PowerPoint® presentation into a pocket-sized handout.
- 2 Save the Web** – Transform Internet Explorer® or Netscape Navigator® pages into double-sided reference booklets.
- 1 Think Small** – Shrink the names from any contact manager into a tiny wallet-sized address book.



ClickBook® 2.0 instantly turns standard pages from the Internet, CD-ROMs, or any Windows program into easily handled double-sided booklets and brochures.

Just a click or two automatically shrinks sports stats, travel information, financial "how to" guides, online documentation, maps, or even photos into incredibly useful double-sided booklets. *ClickBook* automatically shrinks Web pages to fit and prevents right margin clipping. Just "print" to *ClickBook* from Navigator, Internet Explorer, or any other Windows application.



*ClickBook 2.0 for Windows 95 and Windows 3.1 includes 30+ booklet, brochure, business card, and presentation handout styles. If you need just 5 1/2" x 8 1/2" booklets get Surf 'n' Print, a special version of *ClickBook* with only one booklet size optimized for the Internet.*



Get in-depth information and free trial versions of Surf 'n' Print and *ClickBook* at <http://www.clickbook.com>



By Neil Randall

What Happens when You Click

HTTP: The underlying protocol of the World Wide Web.

The Internet runs on protocols—standards by which computers exchange data. Without them, the Internet (or any other network) couldn't exist at all. The underlying protocol for the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol), but individual functions are controlled by protocols that ride atop TCP/IP. When everything's working right, you don't usually notice the protocols, but when you're installing new tools or performing certain functions, they make themselves known constantly. Your e-mail package depends on Simple Mail Transport Protocol (SMTP) and Post Office Protocol (POP), your news reader hooks up through Network News Transfer Protocol (NNTP), and when you download files, you're normally dependent on File Transfer Protocol (FTP). Part of the magic of the World Wide Web lies in the fact that it operates as a multiprotocol environment, which is why you can access Gopher menus, FTP sites, and other Internet services through your Web browser.

But even though the Web allows several protocols, it contains its own underlying protocol as well. That protocol is the HyperText Transfer Protocol (HTTP), which you've probably seen—and typed—more often than you find necessary for your health and happiness. HTTP controls the retrieval of Web documents (HTML files) by your browser; it also controls interaction over the Web through such features as forms. HTTP is currently in Version 1.0, although Version 1.1 has undergone several edits and, at this writing, is well on its way to acceptance as a standard by the Internet Engineering Task Force (IETF). The discussion here is based on Version 1.1 because many of its features have already been adopted by current browsers.

HTTP is set in motion whenever you click on a hyperlink whose URL begins with *http://*, or when you type a URL that starts with that prefix. Actually, most recent browsers—Netscape Navigator, Microsoft Internet Explorer, and Attachmate Emissary, for example—waive the necessity of typing in this prefix by assuming it for all URLs (except for those whose

address portions specifically begin with *ftp* or *gopher*) and adding it to the beginning of the typed string. Once activated, HTTP begins a four-part process consisting of the following stages: connection, request, response, and disconnection (or close). While the features of HTTP have been expanded since the initial protocol design in 1991, these four stages continue to describe the essential process. With most browsers, you can follow these stages on the status bar as they occur.

HTTP is a request-response protocol, and as such, it requires both a client and a server

IP number included in the URL, trying to make contact with that machine. Unless the URL specifies otherwise, HTTP attempts to use port number 80 on the server for this connection. The disconnection or close stage occurs at the end of the HTTP transaction. It is initiated either by the server, as soon as the file is transferred, or by the client, if the user executes the Stop sequence, initiates a new HTTP transaction by clicking on a new hyperlink, or uses the browser's Back or Forward buttons or its history list. Usually, each separate item on a Web page requires a separately initiated connection in order to transfer, but HTTP 1.1 contains a type of persistent connection, called Keep Alive, that can maintain a single connection in order to download multiple files (such as graphics).

THE REQUEST

With the connection established, the request stage begins. Here, the client makes a request of the server, by sending an ASCII message with specific lines and fields. At the top of the message is the request line, after which come three header lines—General Header, Request Header, and Entity Header. After a carriage return/line-feed comes a field called Entity Body. We'll look separately at

each line and field below.

The request line of the HTTP message specifies a number of details, including the method, the Uniform Resource Identifier, and the protocol version. Before we take a detailed look at the method, we'll deal briefly with the other two. The *Uniform Resource Identifier* (URI) is usually either a Uniform Resource Locator (URL) or a Uniform Resource Name (URN), and it exists simply to point to a file or other resource on the network. The *protocol version*, as its name suggests, specifies the HTTP protocol under request. After these specifications, the request contains a type of message that includes a variety of modifiers and other details. Here's a simple illustration:

```
REQUEST SYNTAX
<METHOD> <URI> "HTTP/1.0" <crlf>
{<Header>: <Value> <crlf>}*
<crlf>
```

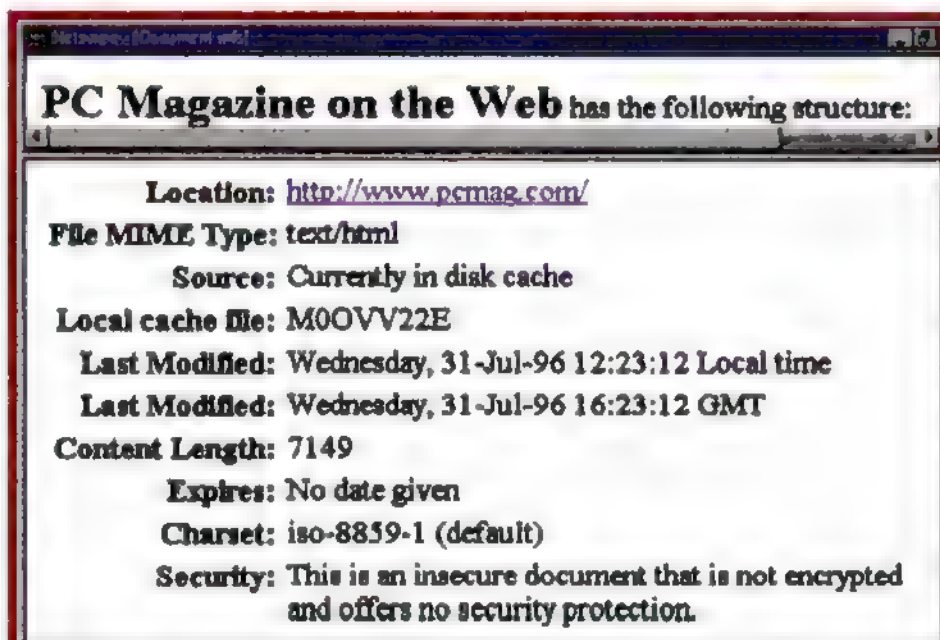


FIGURE 1: The HTTP response includes not only the requested document but also a variety of pertinent information.

to complete transactions. The Web has made "server" a household word, and most Internet users are familiar with the Web server genre of software. *Servers* are computers that hold information and make it available to a requesting *client*, a term that's less well known on the Web, largely because it has been replaced by *browser*. Web browsers are HTTP clients, the software that sends the requests and receives the responses. Basically, the HTTP transaction is simply an ASCII message sent by the client and a response to that message from the server. It's what's inside the message that makes the difference.

CONNECTION AND DISCONNECTION

The first and last stages of the HTTP transaction are the least interesting, so we'll deal with them quickly. In the connection stage, the client attempts to establish a connection with the server. The client looks at the domain name or the

EXAMPLE

```
GET /index.html HTTP/1.0
Accept: text/plain
Accept: text/html
Accept: */*
User-Agent: Browser
```

Each HTTP request line includes a *method*. The three most common methods are Get, Head, and Post; others include Put and Delete. Get, the most common method, is an instruction to the server to send a document or object to the client. In the most common Get request, the Web browser basically says, "Send me the file at such-and-such URL so I can display its contents to the user." Get can be modified by conditional statements specifying modification dates, ranges, and matches. The contents themselves are specified in the Entity Body field of the request, and here's where Get differs from the Head method: With Head, the server sends everything except the Entity Body—or, more simply, it sends information about the file but not the file itself. Head can be used to determine if a hyperlink is valid or if a document has been recently modified. Programs that track updates to your bookmarks, for example, send a Head request.

Increasingly, the Post method has come into play on the Web. If you've built HTML forms, you're already familiar with Post, because this method determines what happens to information submitted through forms. Essentially, Post tells the server to accept the enclosed information as an add-on to the specified URI. Post is used, for example, to place messages on World Wide Web bulletin boards, to add information to a database, and to send data from a Web form to the server. What happens to that data depends on the server itself; it might be passed to a database through a Common Gateway Interface (CGI) script, or it might be appended in a predetermined format to an HTML document to be viewed by others. But that's beyond the HTTP transaction.

Put is similar to Post. It tells the server to store the enclosed information as a file (or resource) named by the URI in the request. If that file doesn't exist, the server creates a new one. If the file does exist, then it overwrites the old one. The main difference between Post and Put is that in Post, the URI names the resource that will take care of the data provided in the HTTP message. What happens to it is determined by the server and might in fact result in the modification of an entirely different resource than the one specified in the URI. In Put, by contrast, the URI refers to the enclosed information, not to a resource on the server, and the server can't do anything with the information other than storing it.

Put is thus the simpler of the two methods, but it's also used less, mainly because server administrators quite understandably want

control over what information goes where. For that reason as well, the Delete method is also little used, except by administrators. Delete tells the server to get rid of the resource specified in the URI line—hardly an action you want to leave to some chance hyperlink clicking. For this reason, servers can be set to allow only certain types of methods.

Several different fields are possible in the Request Header lines of the HTTP message. The Accept header specifies which types of media, such as sound and video files, the response may contain, while Accept-Charset and Accept-Encoding specify the acceptable character sets or encoding techniques for the response. The Authorization header covers authorization between the browser and the server, while a complex set of caching directives are possible with the Cache-Control header. HTTP 1.1 deals extensively with cache-control, which has become an important focus of Web design and management over the past year. Other headers allow the specification of the location and the type of content, current and expiration dates, resource modification details, proxy details, and even information about the browser (User-Agent) making the request. As the Web grows more and more complex, with an increasing variety of interactions and the integration of various new types of media and other features, these headers will come into play more and more. And this isn't even a comprehensive list.

THE RESPONSE

Once the browser has established a connection with the server and sent its request, it waits for a response message. Like the request message, the response consists of several lines of information. At the beginning is the status line, followed by an assortment of response headers, and then the requested document or resource. In most cases, the response takes longer to perform than the request because of this attached resource. This can be reversed for Post and Put requests, but right now most HTTP messages are still very simple Get requests.

The status line of the response contains the HTTP version number, a status code, and a reason phrase. *Status codes* are three-digit indicators of how the request was handled, while the *reason phrase* is the short, plain-language explanation of the code. There are five categories of status codes: 1xx is reserved for information details; 2xx denotes success; 3xx tells you that the URI has been moved; 4xx refers to an error on the browser's part; and 5xx tells you that the server had problems. You've already seen some of these—403 means "forbidden" and 401 means "unauthorized," for example. Other codes indicate that a specified request method isn't allowed (405), that service is unavailable (503), that a media type is unsupported (415), and so on. In fact, the status code is a direct response to the pro-

cessing of the request information. The most common status code, however, is never seen: 200 means "OK," but the browser doesn't display that. It just displays the requested file instead. The following shows a simple response:

RESPONSE SYNTAX

```
"HTTP/1.0" <result-code> [<message>]
➡<crLf>
{<Header>: <Value> <crLf>}*
<crLf>
```

EXAMPLE

```
HTTP/1.0 200 OK
Server: MDMA/0.1
MIME-version: 1.0
Content-type: text/html
Last-Modified: Thu Jul 7 00:25:33
➡1994
Content-Length: 2003
<title>MDMA - Multithreaded Daemon for
➡Multimedia Access</title>
....
[Connection closed by foreign host]
```

Like the request message, the response message can contain header fields. These tell the client software which methods are allowed (Allow), provide information about the content of the message (Content-Language, Content-Length, Content-Type, for example), give details about modification dates, and so on. These headers help the browser interpret the file or resource correctly so that the browser can display it properly. (You can see some of this information by selecting the Document Info command in Navigator's View menu, as shown in Figure 1.)

MORE HTTP

More options are being added to HTTP all the time, to cover such transactions as CGI scripting and, increasingly, security. Secure-HTTP (S-HTTP), for example, adds mechanisms to allow digital signatures and other security features (for more information, check out www.commerce.net:8000/cgi-bin/textit?/information/standards/drafts/shttp.txt). This process of adding on to basic HTTP will continue as the need for more complex interactions grows, and it's a good idea to keep an eye on the W3 Organization Web site (www.w3.org) to find out what's happening. The full HTTP 1.0 protocol is available in HTML format at www.w3.org/pub/WWW/Protocols/HTTP/HTTP2.html, while the HTTP 1.1 specifications can be found at www.w3.org/pub/WWW/Protocols/#ID1106. □

Neil Randall has authored and coauthored several books about the Internet, including the recent *Guide to Netscape Navigator Gold, Special Edition*; *Using Microsoft FrontPage*; and the upcoming *The Soul of the Internet*. He can be reached at nrandall@mariner.uwaterloo.ca.

INTRODUCING SUITE SPOT. THE FULL-SERVICE INTRANET THAT PICKS UP WHERE OTHERS LEAVE OFF.

WHAT IS SUITESPOT?

Picture an intranet that's running at full potential. That's new Netscape SuiteSpot™, the only integrated suite of server software that lets you build a Full-Service Intranet. With SuiteSpot, you can build network productivity applications that help you communicate, collaborate, and share information. Choose any combination of our five different software products: Netscape Enterprise, Mail, News, Proxy, or Catalog Servers. SuiteSpot also comes with our application development and data access tool, LiveWire Pro™.

	SUITE SPOT	BACK OFFICE	LOTUS NOTES
Standards Based Mail, Messaging & Discussion Apps	Yes	Proprietary	Proprietary
Standards Based Distributed Search & Indexing	Yes	No	Only Thru Replication
Server Based Java & Javascript	Yes	No	No
Native Support For Oracle, Sybase, Informix, & ODBC	Yes	ODBC Only	ODBC Only
Cost w/1,000 Clients	\$33,104	\$178,064	\$277,820

SUITESPOT VERSUS ALTERNATIVE SYSTEMS

Unlike older, proprietary technology, only SuiteSpot's open-server product family allows you to build one architecture for Internet and intranet applications – one architecture that's cheaper and easier to maintain. And SuiteSpot easily integrates with current client/server applications running on Unix and Windows NT.

To learn more about SuiteSpot and the Full-Service Intranet, call for your free white paper, "The Netscape Intranet Vision," at 1-800-397-8718.



NETSCAPE

UNLEASH THE POWER!

COREL

VENTURA 7™

POWER PUBLISHING SOFTWARE

ONE DOCUMENT, MULTIPLE DESTINATIONS

Features

- Multiple master pages
- Edit multiple documents simultaneously with MDI
- Artistic text that fits to a path
- Customizable toolbars, keystrokes and menus
- Tables with spreadsheet features and functions
- In-place vector and bitmap-editing tools
- Drag-and-drop editing capabilities
- Corel SCRIPT Editor™ for macro and Wizard programming
- Extend Corel VENTURA™ 7's features with Corel Add-ons
- OLE automation to integrate Corel VENTURA™ 7 with other tools
- All-new Corel VENTURA™ 7 examples and templates
- Operates in Windows® 95 and Windows NT™ environments

Includes

- Corel® WordPerfect® 7
- Corel® PHOTO-PAINT™ 6
- Corel DataBase Publisher
- Corel® CD Creator 2
- Corel SCRIPT Editor™
- Corel® VERSIONS
- CorelDEPTH
- Corel CAPTURE™
- CorelMEMO

Corel VENTURA™ 7 is Internet Ready!

- Easy HTML and Java™ publishing support with Corel Barista™ technology
- Publish your database and Corel VENTURA™ 7 publication weekly or daily at timed intervals automatically with Corel DataBase Publisher
- Create automatic hyperlinks for your tables of contents, footnotes and more
- SGML support through Corel SGML Layout Designer
- Visual DTD (Document Type Definition) editor for DTDs

Workgroup Publishing

- Version control for publications, word-processing files and pictures to archive every version for easy retrieval
- Use Corel VENTURA™ 7's Library to share chapters, style sheets, master pages, text and pictures for a consistent look across your publications
- Password protect your publication and set editing rights for chapters and style sheets
- Build your own interface across all systems to fit your workgroup needs

PAPER:

Create layouts quickly and easily with booklet, tri-fold and tent card layouts.

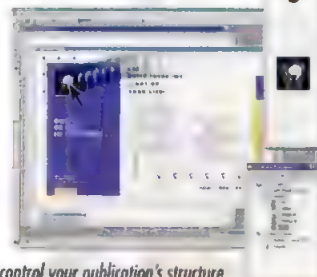


WORLD WIDE WEB: WYSIWYG publishing through Corel Barista™ maintains the original layout, including columns and fonts.

MULTIMEDIA: Archive publications and circulate portable documents with ease.



● Drag and drop images and text files to and from the Corel VENTURA™ 7 Library.



● View and control your publication's structure using the Corel VENTURA™ 7 Navigator. Drag and drop from the Navigator and the Library to share elements across publications.



From the makers of CorelDRAW™

CIRCLE 011 ON READER SERVICE CARD



GLOBAL
1-800-845-6225

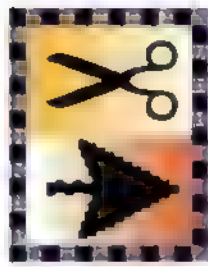
Competitive upgrade
CD-ROM version
\$229.99*
Full CD-ROM version
\$559.99*

*US\$ plus applicable taxes.



<http://www.corel.com>
Call now for faxed literature!
1-613-728-0826 ext. 3080
Document # 1118

Corel, Corel VENTURA, WordPerfect and Barista are either trademarks or registered trademarks of Corel Corporation. Microsoft and Windows are registered trademarks of Microsoft Corporation. CD Creator is a trademark of Adaptec, Inc. All product names, company names and logos are trademarks of their respective corporations.



PC Tech/Utilities

By Douglas Boling

Power to the Right Click!

MenuEdit makes customizing context menus a snap.

Context menus in Windows 95 are convenient, but the built-in tool for editing the menus isn't. In case you haven't found it, the editor is buried under Explorer's View | Options menu item. The Explorer utility offers basic functionality, but it has some serious limitations. This issue's utility, MenuEdit, gets around the built-in editor's limitations and adds some useful new features. You can edit the existing context menus of a specified file type, make context-menu commands available to all file types, or even create context-menu commands for file types the system does not know about. You can also set the default command to be executed when an icon is double-clicked.

MenuEdit's ability to set actions for unknown file types is one of its most useful features. Most machines have files with non-standard extensions like README, FILE.1, or EXPENSE.FEB. With MenuEdit, you can configure your system so that any file of an unknown type will be opened with, for example, WordPad.

You can obtain MenuEdit by downloading it from PC Magazine Online or by mail. (Refer to the sidebar "Guide to Our Utilities" for details.) The source code for MenuEdit is also provided, for those interested in seeing how it works. MenuEdit was created with Microsoft Visual C++ 4.1, but it is written in conventional C. With minor modifications, you should be able to compile MenuEdit with any C compiler that can generate Win32 applications.

USING MENUEDIT

To install MenuEdit, copy the program file, Menuedit.exe, to your hard disk and create a shortcut to it. Once started, MenuEdit displays its main window, whose easy-to-use controls can help you modify the context menus of every file on your system (see Figure 1).

On the left side of the window are three radio buttons and a list box, for selecting a file type. For now, let's skip the first two radio buttons and click on the third, Menu Items for Specific File Types. This will activate the list box, which enumerates all the file types registered in your system, such as application, Briefcase, Write document, and so forth. If you have Microsoft Office for Windows 95 or one of the other application suites available

for Windows 95, you should see many other file types.

Note that the file types listed in Explorer and MenuEdit are not identical. Explorer's "file types" include, in addition to files, other object types, such as Folder and Drive. Explorer also does not list all registered file types. It excludes, for example, device drivers (.VXD) and application extensions (.DLL). MenuEdit includes only file types, lists all registered file types, and lets you edit or add to their context menus. Unlike Explorer, however, MenuEdit does not let you add or remove file types.

After you've selected the third radio button,

IN THIS ISSUE

MenuEdit

MenuEdit lets you easily edit the commands available on context menus and add new ones. You can make menu commands available to all files on the system, to all files of a specified type, or to all file types the system does not know about. You can also set the default command to be executed when an icon is double-clicked.



select Bitmap Image from the list box. You should see two actions listed in the Menu Commands list box: Open and Print. These are the context menu commands currently designated for bitmapped files. The open command should have "(Default)" appended to it, indicating that this is the command to be executed when you double-click on a bitmapped-file icon.

Now go into Explorer and find a bitmapped file; a good place to look is in your Windows directory. Right-click on the icon of any bitmapped file. You should see the Open and Print commands, followed by Send To, Cut, Copy, Create Shortcut, and a few other commands. The menu items after Print are set by Explorer and cannot be changed without

writing extensions to the Windows 95 shell. The Open and Print menu items, however, are stored in the Registry and can be changed.

Back in the MenuEdit window, select Open in the menu-item list and click on the Edit button (see Figure 2). You'll see the Edit Action dialog box, which specifies the command that will be executed when you select the Open menu item. On most systems, the command launches the Paint applet (Mspaint.exe) that comes with Windows 95. Since Open is the default command, Paint is also the application that is started when you double-click on a bitmapped file.

You can change the action by editing the Application Used to Perform the Action field in the Edit Action dialog box. Perhaps you would prefer to use your own bitmap editor instead of Paint. To do this, you would change the application field to launch your editor instead of Paint.

Notice that below the command line field there is a Use DDE section. With advanced programs, such as Microsoft Word and other high-end editors, Windows can use DDE (Dynamic Data Exchange) to communicate the name of the file to be edited. Using DDE can save time if the program is already running. Check the documentation of your favorite editor to see if it supports DDE and what command strings are appropriate for these DDE fields. You can see examples of these strings if you select Microsoft Word document in the file-type field and edit the Open command.

Once you have made the changes you want, click on the OK button to save the changes. You do not need to exit MenuEdit for the changes to take effect; they are immediately reflected in the system.

You can also add new menu items to a file type. For example, let's say you'd like to have the option of opening a .TXT file with Word when you right-click on its icon. (I use Microsoft Word to flow .TXT files and save the line breaks in the file.) Select Text Document from the list of file types and click on the New button in MenuEdit. You will see a dialog box that's almost identical to the Edit dialog box just discussed. Enter a name for the action: in this case, "Open with Word." The name will appear on the context menu. Then, in the command field, enter the completely speci-

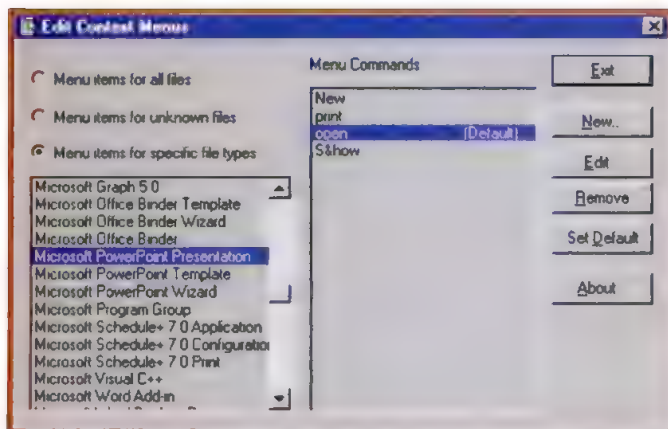


FIGURE 1: The menu commands for the selected file type are shown in the list box to the right.

fied pathname for Word, along with a parameter to be passed when the program is launched. On my system, the command is

```
D:\MSOFFICE\WINWORD\WINWORD.EXE %1
```

Windows 95 replaces the %1 with the name of the file to be edited. (Another useful parameter is %2, the default printer.) Word can use DDE, but for this simple example there is no need for it, so you don't need to check the Use DDE box and fill in those fields. Click on OK to save the data. Now find a .TXT file with Explorer and right-click on the icon. You should see a new menu item, Open with Word. If you select that item, you'll launch Word, with the .TXT file loaded.

With MenuEdit, you can also change the default action to be taken when you double-click on an icon for a given file type. I rarely run .BAT files from Explorer. In fact, I typically run them accidentally, by double-clicking on one when I mean to edit it. Fortunately, MenuEdit can solve that problem. From the MenuEdit menu, select MS-DOS Batch File. Click on the Edit menu item, then click on the Set Default button. The default action is now set to Edit. If you right-click on a .BAT file in Explorer, you'll notice that the Edit menu item is now displayed in bold type, indicating that it is the default menu action. Click somewhere else to close the context menu. Now double-click on the .BAT file. Instead of running the .BAT file, you'll launch Notepad, with the .BAT file loaded and ready for editing.

To complete the job, edit the Open menu item for the .BAT file. Change Open, in the Action field, to Run, which more accurately describes what you want to do with this menu item. Click on OK to save the changes.

Now that we have cleaned up the menu item for a specific file type, we can move on to more general menu items. Click on the Menu Items for Unknown Files radio button. You should see one menu item, openas. This menu item displays the annoying Open With dialog,

which asks you what program you want to use to open the file.

Since many files contain text, it might be handy to have Windows 95 open the file with a text editor, preferably one that can display the file in hexadecimal, if it contains material that is not plain text. On my system, I have added a View command to the context menu for unknown file types; it opens unknown files with my

programming editor, CodeWright. (You can use any editor that handles binary files, such as WordPad.) I have even set the default action to View so I don't have to see the Open With dialog box unless I specifically request to do so.

Clicking the top radio button lets you modify menu items for all files on your system. You have to be careful about the names of the menu items you add to this list, because the items added with All File Types specified appear even if a menu item of the same name already exists, so you could end up with duplicates. For example, let's say you were to add a View command to open all file types with Notepad. If any file type has its own View command that uses a different application, both commands will appear in its context menu, and you won't be able to tell which is which. Still, this option can be quite useful.

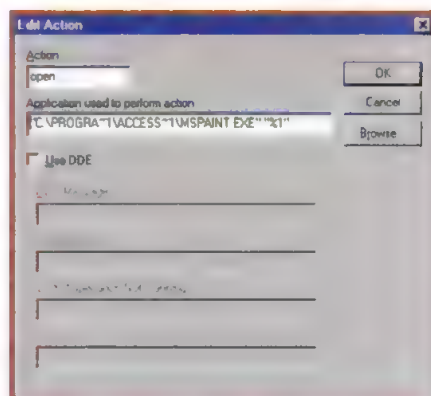


FIGURE 2: The Edit Action dialog box shows the command to be executed when a menu item is selected.

For example, you can add a Virus Check menu item to the All Files menu, so that you can easily check any file for viruses with a simple right-click on its icon.

The Remove, About, and Exit buttons complete the tour of the MenuEdit window. If you want to delete a menu item, all you need

to do is select the item from the menu list and click on the Remove button. MenuEdit will ask you to confirm that you want to delete the item before it removes the item from the menu list. The About button displays the About box, which contains copyright information and the author's name.

The Exit button, as you would expect, terminates MenuEdit. Remember, the changes you make with MenuEdit take effect immediately, as you make them; you do not have to wait until closing MenuEdit to see the changes reflected on the system.

UNDER THE COVERS

Just how does MenuEdit perform its magic? Does it hook into some undocumented interface deep inside Windows 95? Does it monitor all mouse clicks to determine when it needs to jump into action? No. In fact, Windows 95 does all the work; all MenuEdit does is make a few changes to the Windows configuration database known as the Registry.

The Registry contains the configuration information for all of Windows 95. Think of it as WIN.INI and SYSTEM.INI (the configuration files used by Windows 3.x) on steroids.

One part of the Registry is devoted to file-type control. Actually, Windows 95 is exceedingly dumb in how it recognizes file types; it uses only the file extension. The Registry has a cross-reference that associates all the file extensions it knows about with the names of the Registry entries that contain information about that file type—how to open it, what icon to use in Explorer, and so forth. Because information on a file type is stored separately from the extension entry for a file type, multiple extensions can be mapped to the same file type.

When you double-click on a filename, Windows 95 checks the Registry for a key whose name matches the file's extension. If it finds one, Windows gets the name of the file-type key from the extension entry. It then looks again in the Registry for the file-type key. Under the file-type entry, the system finds a list of commands, or, as the documentation refers to them, a list of *verbs*. Under each verb is a command line string and, in some cases, a set of DDE commands. Windows 95 finds the default verb, gets the command line for the verb, and executes the command line. In the case of the DDE commands, Windows 95 initiates a DDE conversation with the appropriate application.

That's the 5-cent tour of how program associations work in Windows 95. Now let's examine the process in more detail.

The Registry is a hierarchical database with six main keys:

- HKEY_CLASSES_ROOT
- HKEY_CURRENT_USER
- HKEY_LOCAL_MACHINE
- HKEY_USERS

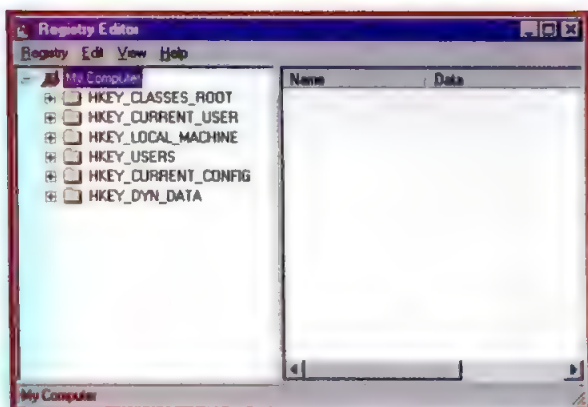


FIGURE 3: *RegEdit*, a utility that comes with Windows 95, lets you view and edit the system Registry.

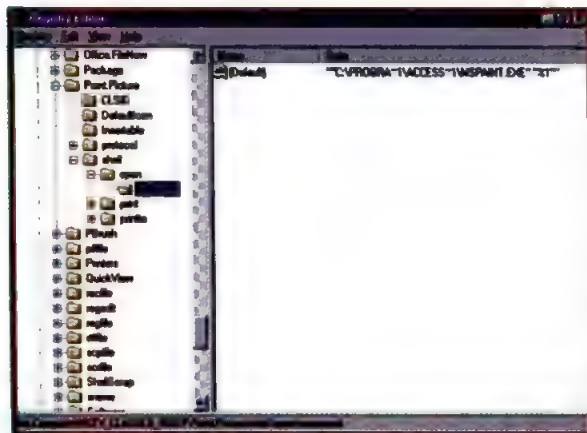


FIGURE 4: If you drill down in *RegEdit*'s tree view, you'll come to the area where the context menu commands are stored for bitmapped files.

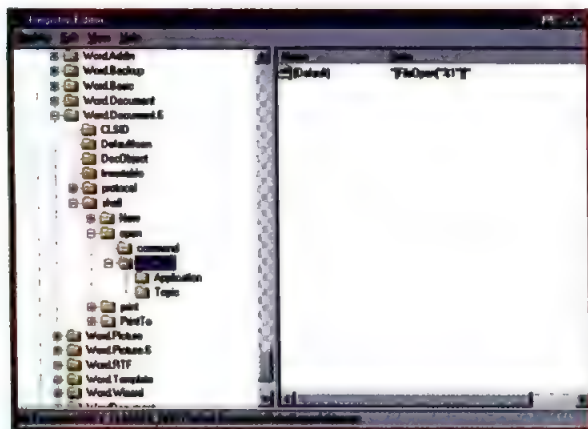


FIGURE 5: DDE commands, for programs that accept them, are stored under a separate subkey.

- HKEY_CURRENT_CONFIG
- HKEY_DYN_DATA

Each main key subdivides the database into functional parts that store the settings for a specific user, a specific machine configuration, default configurations for each, and a set of performance statistics. The only key relevant to our discussion is HKEY_CLASSES_ROOT.

Under each of these major keys is a list of subkeys, which can have associated values as well as subkeys of their own. The structure of the Registry is analogous to the structure of files on a hard disk: If the major keys are like drives, then the subkeys are like directories, and the values of the subkeys are like files. (For a more detailed description, read the series "The Windows 95 Registry," from our issues of October 24, 1995, November 7, 1995, and January 9, 1996.)

HKEY_CLASSES_ROOT is actually a carryover from a more primitive registry design in Windows 3.1. This section of the Registry associates file extensions with specific file types and those file types with programs that operate on the file types. There is other information in this section, primarily involving OLE and extensions to the Windows 95 shell.

To follow this discussion, you might want to start a program called *RegEdit*, which comes with Windows 95. Select the Run menu item under the Start menu and enter REGEDIT. A window will appear, with a tree view of the different keys in the left pane and a data list in the right pane (see Figure 3). This first entry in the tree view is the HKEY_CLASSES_ROOT key; double-clicking on it will expand the tree to show the subkeys under it.

The first thing you'll see in the list of subkeys is a series of file extensions, each of which starts with the dot separator. You should see a .bmp key somewhere near the top of the alphabetically sorted list. Clicking on the .bmp key causes *RegEdit* to display the contents of that key in the right pane. In the case of the .bmp key, the contents will be Paint.Picture, an indication that the default editor is the Paint applet.

Now that we have the longer text description for .bmp files, we can look for a key with this name in the same list. Scroll down *RegEdit*'s tree view until the Paint.Picture key becomes visible. Double-clicking on this key will display the subkeys under Paint.Picture. With a standard Windows 95 configuration,

you should see a number of subkeys under Paint.Picture, but the only one that interests us here is the Shell subkey.

Double-clicking on the Shell subkey will display the context-menu command set for this file type. For bitmapped files, there are typically three subkeys: Open, Print, and Printto. Double-clicking on the Open subkey reveals a Command subkey (see Figure 4). Now we have finally reached the end of our Registry key chain. The value assigned to the Command subkey is the command that Windows 95 executes when a bitmapped file is double-clicked. In this case, the command is typically C:\Progra~1\Access~1\MSPAIN~1\MSPAINT.EXE %1, which is the shortened version of the path to Microsoft Paint, typically located in C:\Program Files\Accessories.

The function of *MenuEdit* is to change the settings under the Shell subkey for each file type requested. So, as we discussed above, if you add an Open with Word command to .TXT file context menus, *MenuEdit* will add an Edit subkey to the Shell subkey under the txtfile subkey. Once the Registry has been changed, Windows 95 automatically adds the command to the context menu the next time you right-click on a batch file.

For commands that use DDE, an additional subkey called ddeexec is added, next to the Command subkey. Under that subkey resides the information to handle the DDE conversation. For a peek at how a DDE-configured command looks in the Registry, examine the Word Document.6\shell\open subkey (see Figure 5). This key describes the DDE commands that take place when you open a .DOC file.

There are a few other subtleties involving these Registry entries—for example, how to specify the default menu item. The default value of the Shell subkey defines which menu command will be the default. If the Shell subkey's default value is empty, or if it is not the name of an existing menu command, the Open command becomes the default. If there is no Open command, the first subkey under Shell is the default.

Another interesting aspect of these context menus is that the subkey name under Shell may not be the text that appears in the context menu. If you specify menu item text that is too long or that contains characters that cannot be used in context-menu verb names, the actual text of the menu item is contained in the default value for that menu-item key. For example, a menu item My Dog Has Fleas would appear under Shell as a key named My_Dog_Has_Fleas with a default value of "My Dog Has Fleas." If Windows 95 finds any text in the default value for a Shell subkey, it will use the default value text instead of the key text in the context menu.

Finally, let's discuss how to add menu com-

THE TOP 10 UTILITIES

mands to unknown file types or to all file types. The unknown file types are handled by a special key under HKEY_CLASSES_ROOT called Unknown. It has the same format as any other file type. Another key, *, is used for all files. It, too, has the same format as any other file type. Although these types exist in the Registry, Explorer does not give you access to them. MenuEdit does.

Fortunately, MenuEdit does not have to know the format of the Registry files to make changes to the Registry. Windows 95 provides a vast and somewhat confusing array of Registry functions, which are roughly analogous to file-handling functions. Keys are opened (Reg-

OpenKey), modified (RegSetValue), and closed (RegCloseKey). There is also a set of Reg commands that let programs query the contents of keys and subkeys. Finally, with Win32, there is a new set of parallel, extended-functionality Reg functions that have an "Ex" appended to the function name.

With enough time and work, you can achieve

does not restrict you in what you can edit, and it lets you add menu items to all file types or to all files of an unknown type. MenuEdit provides an easier, more flexible way to configure context menus on your machine. □

Douglas Boling is a contributing editor of PC Magazine.

- 1 **QUOD** A new computer game
- 2 **INCTR3** Monitors Win 95 installations
- 3 **CHECKE** Windows checkers game
- 4 **FDDLLS** Finds dead DLLs
- 5 **WINBAR** Runs programs automatically
- 6 **SPAD** Enhanced Windows notepad
- 7 **PICALB** Organizes image files
- 8 **1MBF** Protects low memory
- 9 **MULTIL** Adds launch choices in Win 95
- 10 **INCTR2** Monitors program installation

GUIDE TO OUR UTILITIES

ABOUT MENUEDIT...

DESCRIPTION MenuEdit lets you easily edit the commands available on context menus and add new ones. You can make menu commands available to all files on the system, to all files of a specified type, or to all file types the system does not know about. You can also set the default command to be executed when an icon is double-clicked.

USAGE To install MenuEdit, copy the program file Menueedit.exe to a directory on your hard disk and create a shortcut to it. When you launch MenuEdit, you'll see a set of three radio buttons on the left side of the window; these let you select file types. The first option, Menu Items for All Files, lets you edit the context menus for all file types on your system. The second option, Menu Items for Unknown Files, lets you edit the context menus for file types not registered on your system. If you select the last option, Menu Items for Specific File Types, the file-type list box below the radio buttons will become enabled, allowing you to select from all of the file types registered on your system.

When you select a file type from the list, the commands associated with that file type appear in the list box on the right side of the window. You can add to this list by pressing the New button. If you select an item in the list and press the Edit button, the command associated with that menu item will be displayed for editing. If you press Delete, the item will be removed from the menu. If you select Default, the selected item will be the one chosen when you double-click on a file of that type.

Some programs, such as Microsoft Word for Windows or Microsoft Excel, can communicate with each other through DDE. If the command associated with the item launches a program that accepts DDE, you can check the DDE box and add DDE commands. See the manual or online help for the DDE-enabled program to find out the correct syntax.

SUPPORT Help for PC Magazine's free utilities can be obtained electronically in the Utilities section of ZD Net's TIPS Forum (GO

ZNT:TIPS). The authors of current utilities generally visit this forum daily. You may find an answer to your question simply by reading the messages posted in the forum. If the author is not available and the forum sysops can't answer your question, the Utilities column editor, who also checks this forum each day, will contact the author for you.

...AND GETTING PC MAGAZINE UTILITIES



Here's how you can access PC Magazine Online, where you'll find all our utilities and other PC Tech files:

ZD NET To join CompuServe/ZD Net (formerly Ziff-Net), call 800-895-4596 (voice) and request the PMZ offer. CompuServe members can join ZD Net by typing GO ZIFFMEM at any CompuServe ! prompt. If you're already a member of ZD Net, you can get the current utility free of connect charges by typing GO FREEUTIL at any CompuServe ! prompt. Other PC Tech Files are available individually, in the Utilities/Tips and Programming Forums, and bundled, within volume archive files.

INTERNET You can obtain the utility and a volume archive file by visiting our World Wide Web site at www.pcmag.com and choosing Download from the navigation bar that's found at the bottom of every page.

You can also get the files through anonymous FTP from our Internet site. The address is [ftp.zdnet.com](ftp://ftp.zdnet.com). Use the word anonymous as your log-on name and any of your e-mail addresses as the password. Look in the subdirectory [pcmag/1996/1022/](ftp://ftp.zdnet.com/pcmag/1996/1022/). The volume archive filename is v15n18.zip. The utility and archive are compressed with PKZIP, Version 2.04.

BY FAX OR MAIL If you don't have a modem or Internet access, you can fax 508-368-0141 or write to PC Magazine Utilities, c/o Image Software Services, 55 Green St., Clinton, MA 01510-3099.

The programs presented in PC Magazine can be copied but are copyrighted. You may make copies for others if no charge is involved, but making copies or using any portion for any commercial purpose is strictly prohibited.

PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

User-to-User

By Neil J. Rubenking

Dropping Files on a .BAT File in Windows 95

Windows 95's ability to let you drop files onto a batch file opens up some interesting possibilities. I wrote VUZIP.BAT (Figure 1) and MKZIPBAT (Figure 2) to take advantage of this feature. I keep a shortcut to VUZIP.BAT on the desktop. When I drop a .ZIP file onto the shortcut, VuZip displays a list of the files in the .ZIP archive and lets me decide whether or not I want to unzip. If I choose Yes, it unzips the archive into a temporary subdirectory and then brings up the Explorer so I can move the files to a more permanent location.

For added functionality, you can assign VuZip as the default handler for .ZIP files. In

any Explorer window, select View | Options and click the File Types tab. Click Add and enter the description (PkZip Archive) and extension (.ZIP). Click the New button and in the Action box, enter a speed-menu item name (&Unzip), and in "Application used to perform action," put the full pathname of the batch file (for example, c:\batch\vuzip.bat). Click OK and close to accept the settings (you may want to choose an icon for .ZIP files on the way out). Now double-clicking on any .ZIP file will run VUZIPBAT.

To make this batch file work smoothly as a drop target, you should change a few of its properties. Right-click on the VuZip shortcut icon, select Properties, click the Program tab, and check "Close on exit." Set the initial size to 50 lines on the Screen tab, then click the Font tab and pick a readable font.

A Windows 95 limitation makes the MkZip batch file a bit problematic. When you drop more than a few files onto it, the batch file does not even run or, worse, Windows 95 displays the scary message, "A device attached to the system is not functioning." My workaround is to put a folder named TmpZip on the desktop next to the MkZip icon. Then I can drag a bunch of files and folders into that folder and drop the entire folder into MkZip.

As with VuZip, I again send the output to a hard-coded location in the TEMP directory, and bring up Explorer for easy access. The MkZip shortcut's properties should be set in the same way as VuZip's; in addition, you should set it to run minimized. This batch file shows several handy techniques: creating a unique filename,

```
@ECHO OFF
REM - VUZIP.BAT displays zip list and lets you unzip
Deltree /y %TEMP%\ZIPPED
Mkdir %TEMP%\ZIPPED
if NOT (%1) goto OK
cls
Echo -
Echo - Drop a .ZIP file onto this icon to view its
Echo - contents and optionally unzip to a temporary
Echo - directory.
Echo -
Pause
:OK
if (%1) goto End
cls
REM the -vm displays the files and pauses between
REM screenfuls
pkunzip -vm %1
Choice "Unzip to %TEMP%\ZIPPED [Yes/No]?" /N /c:YN
REM -- only take action on Y (yes, unzip, else goodbye)
if errorlevel 2 GOTO Next
pkunzip -d %1 %TEMP%\ZIPPED
set show=Y
:Next
Shift
GOTO OK
:End
IF '%show%'=='Y' Explorer /e,%TEMP%\ZIPPED
Exit
```



FIGURE 1: When you drop a .ZIP archive onto this batch file, it displays the archive's contents and optionally unzips them.

HIGHLIGHTS



HARDWARE If you're having problems with your monitor, you may want to check the voltage at the power outlet. Page 264



OPERATING ENVIRONMENTS Adding viewers to OS/2 Warp's Web Explorer is no easy task, but if you don't mind getting your hands dirty, there is a way to do it. Page 269



WORD PROCESSING How to get around a bug in WordPerfect that bloats files containing graphics each time you edit them. Page 272

OUR ADVISORS

Douglas Boling is a contributing editor and the author of many PC Magazine utilities.

Frank J. Derfler, Jr., is senior networking editor and the author of the PC Magazine Guide to Connectivity.

Alfred Poor is a contributing editor and the author of The Underground Guide to Hardware.

Brian Proffitt is a senior contributing editor of OS/2 Magazine and the author of OS/2 Warp Survival Kit.

Jeff Prosser is a contributing editor and the author of DOS 6 Techniques & Utilities.

Sal Ricciardi is a contributing editor and the author of the Running FoxPro series from Microsoft Press.

Neil J. Rubenking is technical editor and the author of Delphi Programming Problem Solver.

Luisa Simone is a contributing editor and the author of Microsoft Publisher by Design.

Craig Stinson is a contributing editor and the coauthor of Running Windows 3.1 and Running Microsoft Excel.

M. David Stone is a contributing editor and the coauthor of Word for Windows Companion, Second Edition.



PC DIRECT starts here with exciting offers from top direct vendors. See index, page 264.



OUTSTANDING SER

COMPUTER DISCOUNT WAREHOUSE



TOSHIBA

Tecra 500CS and 500CDT

- ◆ 120MHz Intel Pentium® processor
- ◆ 16MB EDO RAM standard, upgradeable to 144MB ◆ 1.26GB hard drive
- ◆ Internal 6X CD-ROM drive, swaps with standard 1.44MB floppy drive (500CDT)
- ◆ 12.1" dual-scan (500CS) or TFT active-matrix (500CDT) SVGA color display
- ◆ Integrated 28.8K bps fax/modem



500CS

\$3657.56

CDW 70242

500CDT

\$4519.30

CDW 70243

Tecra 730CDT

- ◆ 150MHz Intel® Pentium® processor
- ◆ 16MB EDO RAM standard, expandable to 144MB ◆ 2GB removable hard drive, 3.5" 1.44MB floppy drive ◆ 6X CD-ROM drive ◆ 12.1" TFT active-matrix color display ◆ Integrated 28.8K bps (V.34) modem

\$6002.37

CDW 73155



Portege 650CT

Ultra-portable multimedia-to-go

- ◆ 133MHz Intel Pentium® processor
- ◆ 16MB EDO RAM standard, upgradeable to 80MB ◆ 1.26GB hard drive ◆ External 1.44MB floppy drive
- ◆ 11.3" TFT active-matrix SVGA color display ◆ Integrated 28.8K bps fax/modem

\$4339.19

CDW 70244

Only 4.99 flat



IBM® ThinkPad® 365ED

The speed and value you need in a full-size, multimedia notebook computer

- ✓ 100MHz 5x86C CPU ✓ 8MB RAM standard, expandable to 24MB ✓ 540MB hard drive
- ✓ Integrated 4X CD-ROM drive ✓ External 3.5", 1.44MB floppy disk drive ✓ 10.4" dual-scan color display ✓ Pre-loaded Windows® 95 ✓ 6.4 lbs.
- ✓ 1-year warranty with International Warranty Service*

PRICE DROP! ThinkPad 365ED with 4X CD-ROM

\$1969.00

CDW 73201

*Lotus SmartSuite 95 CD ROM included with all IBM ThinkPads shipping with the Windows® 95 operating system. Diskette copies and hard copy documentation can be ordered for a fee through the IBM fulfillment center at 800.552.515.

SPECIAL PURCHASE!

IBM ThinkPad 365ED

- ✓ 100MHz 5x86C CPU
- ✓ 16MB RAM
- ✓ 810MB hard drive
- ✓ 4X CD-ROM drive
- ✓ 10.4" active-matrix display

\$2537.28

CDW 73202

COMPAQ

Armada 4100

Slimline portability and outstanding multimedia capabilities

- ◆ Intel Pentium® processor
- ◆ 8MB or 16MB RAM standard, 40MB or 48MB maximum respectively
- ◆ 810MB or 1.08GB hard disk drive ◆ 11.3" dual-scan or 11.8" TFT active-matrix (4120T, 4130T) SVGA color display ◆ 16-bit stereo sound with integrated speakers
- ◆ Standard touchpad pointing device ◆ 3-year worldwide limited warranty

4110 100MHz, 8MB, 810MB **\$2496.17** CDW 71112

4120T 120MHz, 16MB, 1.08GB **\$3744.82** CDW 71115

4130T 133MHz, 16MB, 1.08GB **\$4417.17** CDW 71116



Shown with optional touchball



The Intel Inside® Logo and Pentium® are Registered Trademarks of Intel Corporation

Visit our web site!

www.cdw.com



VICE & SELECTION



3Com EtherLink III

The industry's fastest PC Cards

▲ The industry's fastest LAN+28.8 PC Card Modem connects at higher speeds more often ▲ Quicker system response, faster data transfers—up to 46% faster than the competition ▲ Plug and Play compatible under Windows 95 ▲ Cellular-ready (LAN+28.8 Modem only) ▲ Guaranteed compatibility with leading notebooks or your money back within one year of purchase ▲ Lifetime warranty

LAN+28.8 Modem PC Card.....	\$414.30	CDW 72166
LAN+28.8 Modem PC Card-Combo.....	\$445.31	CDW 71985
LAN PC Card-TP.....	\$138.98	CDW 61088
LAN PC Card-Combo.....	\$184.37	CDW 61902



3Com EtherLink III LAN Plus Modem

HP DeskJet 340

Portable Inkjet Printer

The printer that makes anyplace your workplace!

- ◆ Sharp 600 x 300 dpi monochrome output
- ◆ 3 ppm fast high-quality printing
- ◆ Parallel interface, 18KB print buffer
- ◆ Includes HP color kit, a \$35 value
- ◆ Streamlined, lightweight 4.3 lbs—fits easily into a briefcase

*After \$50 manufacturer's rebate
Offer valid 8/1/96-1/31/97

\$243.84*
CDW 60751



\$50 rebate*



Targus Deluxe Universal case

◆ Padded computer and printer section: 16.5" x 12" x 2.5" ◆ Accessory/clothing compartment: 17.5" x 13" x 2" ◆ Multiple interior pockets for multimedia CDs, cellular phone, files, disks, pens and business cards ◆ Accordion file pocket ◆ Zip-down workstation with pockets ◆ Padded, ergonomic shoulder strap

\$129.99
CDW 68747



AllPoints Wireless PC Card

Stay connected anywhere

✓ Wireless e-mail, faxing, database accessing and real-time, two-way messaging ✓ Type II PC Card - works with your notebook, PowerBook, palmtop or PDA ✓ MASC protocol ensures the integrity of transmitted data ✓ Small and lightweight - travels easily with your mobile computer ✓ NiCad 9-volt battery for up to 30 hours of operation ✓ Includes RadioMail and Wynd wireless application software ✓ 2-year warranty ✓ Additional subscription required for services



\$464.12
CDW 67589



MEMORY UPGRADES



Ascentia 900N, 910N	8MB	\$118.65	4650
Ascentia 900N, 910N	16MB	\$269.01	43457
Ascentia 950N	8MB	\$157.13	45299
Ascentia 950N	16MB	\$258.44	45474
Ascentia J10, J30, EP series	8MB	\$112.04	68211
Ascentia J10, J30, EP series	16MB	\$264.35	68809
Ascentia J10, J30, EP series	32MB	\$481.69	68810
Ascentia P30, P50	8MB	\$162.23	72097
Ascentia P30, P50	16MB	\$292.86	72098



Armada 1120	8MB	\$159.45	71879
Armada 1120	16MB	\$258.44	71880
Contura Aero	4MB	\$84.57	46702
Contura Aero	8MB	\$133.36	41720
Contura 400C, 400CX, 420, 430	4MB	\$86.92	47905
Contura 400C, 400CX, 420, 430	8MB	\$143.82	47906
Contura 400C, 400CX, 420, 430	16MB	\$279.30	47915
LTE Elite 5000	8MB	\$147.89	67486
LTE Elite 5000	16MB	\$253.04	67486
LTE Elite 5000	32MB	\$467.56	67487
LTE Elite 5000	64MB	\$892.00	67488



OmniBook 600 4/75	4MB	\$129.85	47672
OmniBook 600 4/75	8MB	\$149.21	47673
OmniBook 4000	4MB	\$92.65	57493
OmniBook 4000	16MB	\$256.50	57490



ThinkPad 365, 560, 760E	8MB	\$159.77	69680
ThinkPad 365, 560, 760E	16MB	\$271.29	69704
ThinkPad 500/510Cs	32MB	\$927.70	71914
ThinkPad 500/510Cs	4MB	\$114.82	33014
ThinkPad 500/510Cs	8MB	\$201.66	33014
ThinkPad 701C, 701Cs	8MB	\$201.88	52716
ThinkPad 701C, 701Cs	16MB	\$247.72	52726
ThinkPad 750	4MB	\$160.30	45180
ThinkPad 750	8MB	\$163.74	45181
ThinkPad 750	16MB	\$266.11	45182
ThinkPad 750	32MB	\$551.27	43310
ThinkPad 755	4MB	\$99.67	42715
ThinkPad 755	8MB	\$142.62	42716
ThinkPad 755	16MB	\$261.00	42717
ThinkPad 755	32MB	\$549.37	43309
ThinkPad 760, 760C, 760CD, 760L, 760LD	4MB	\$69.92	67887
ThinkPad 760, 760C, 760CD, 760L, 760LD	8MB	\$124.84	67704
ThinkPad 760, 760C, 760CD, 760L, 760LD	16MB	\$209.00	67893
ThinkPad 760E, 760ED, 760EL, 760ELD	8MB	\$159.77	69680
ThinkPad 760E, 760ED, 760EL, 760ELD	16MB	\$271.29	69704



Versa 2000C, D, S	8MB	\$67.12	44183
Versa 2000C, D, S	16MB	\$128.20	44184
Versa 2000C, D, S	32MB	\$209.00	44186
Versa 6000 series	8MB	\$169.15	71595
Versa 6000 series	16MB	\$276.71	71593
Versa 6000 series	32MB	\$523.75	71584
Versa 6000 series	64MB	\$1400.66	71585
Versa V, Ultralite Versa, Versa 4000	4MB	\$87.26	60656
Versa V, Ultralite Versa, Versa 4000	8MB	\$132.04	30597
Versa V, Ultralite Versa, Versa 4000	16MB	\$211.60	44291
Versa V, Ultralite Versa, Versa 4000	32MB	\$257.18	31342
Versa V, Ultralite Versa, Versa 4000	64MB	\$501.70	43040
Versa V, Ultralite Versa, Versa 4000	128MB	\$121.01	43041



Extensa 450, 500, 570 series	4MB	\$67.12	58664
Extensa 450, 500, 570 series	8MB	\$127.53	58665
Extensa 450, 500, 570 series	16MB	\$249.08	58666
TravelMate 5300	8MB	\$147.89	68610
TravelMate 5300	16MB	\$153.18	68609
TravelMate 5300	32MB	\$289.29	68608



Satellite 100CS, 105CS	8MB	\$167.69	61115
Satellite 100CS, 105CS	16MB	\$301.73	61116
Satellite 100CS, 105CS	32MB	\$549.51	61117
Portege 610CT	8MB	\$155.18	67892
Portege 610CT	16MB	\$283.52	67893
Portege 610CT	32MB	\$449.09	67894
Portege 650, Tecra 500	8MB	\$155.89	62545
Portege 650, Tecra 500	16MB	\$304.26	62544
Satellite Pro 400	8MB	\$162.69	61115
Satellite Pro 400	16MB	\$304.73	61116
Satellite Pro 400	32MB	\$549.51	61117
Satellite Pro 410 series	8MB	\$165.74	60666
Satellite Pro 410 series	16MB	\$291.86	60667
Satellite Pro 410 series	32MB	\$549.51	61117
Tecra 700CS, 700CT	8MB	\$220.36	62119
Tecra 700CS, 700CT	16MB	\$380.64	62121
Tecra 700CS, 700CT	32MB	\$703.97	62126
Tecra 710COT, 720COT	8MB	\$155.18	67892
Tecra 710COT, 720COT	16MB	\$283.52	67893
Tecra 710COT, 720COT	32MB	\$449.09	67894

Simple Technology offers upgrades for most of today's PCs, workstations, portables and printers. Please call for current pricing and availability. Advertised prices effective until September 30, 1996.



CDW® sells for less and services you better!™

800-998-4239 (4CDW)

Free configuration of your new notebook purchase from CDW®!

COMPUTER DISCOUNT WAREHOUSE™



MAKE CDW YOUR

COMPUTER DISCOUNT WAREHOUSE

**CDW
Special
Purchase!**



Monitor sold separately
Product appearance may differ

AST.

AST 575

▲ 75MHz 5x86 CPU ▲ 8MB RAM standard, expandable to 128MB ▲ 630MB hard drive ▲ 32-bit PCI graphics ▲ 1MB video RAM
▲ Includes keyboard and mouse ▲ 1-year warranty

\$649.00

CDW 73926

**Super
Savings!**

COMPAQ PRESARIO



4112

NEW AT CDW!

Special Features:

- ▲ Easy Access Buttons offer quick access to the audio CD player, speakerphone, phone messages, SmartQ help and energy-saving sleep mode functions
- ▲ Amazing sight, sound and motion with JBL Pro speakers and full-motion MPEG support
- ▲ Fast online access with a 33.6K bps data/fax modem

Monitor and speakers sold separately

Desktop	CPU	RAM	Hard Drive	CD-ROM Drive	Price	CDW
4112	120MHz Pentium	16MB	1.6GB	6X	\$1499.00	73385
4122	150MHz Pentium	16MB	2.5GB	8X	\$1899.00	73386
Mini-tower	CPU	RAM	Hard Drive	CD-ROM Drive	Price	CDW
4704	133MHz Pentium	16MB	1.6GB	6X	\$1699.00	73389
6704	166MHz Pentium	24MB	2.5GB	8X	\$2399.00	73392



Aptiva

Touch new worlds of power with IBM's Aptiva

All Aptiva models come with a host of advanced telephony capabilities that include a phone answering system, voice mail with remote access, full-duplex speakerphone and more. IBM VoiceType™ Control for Windows, Aptiva's voice recognition feature, permits voice commands like "Open," "Quit," and "Print." Aptiva's Total Image Video provides full screen, full motion MPEG playback for remarkably sharp video images and TheatreSound produces powerful "CD-quality" sound from two amplified stereo speakers.

- Intel® Pentium® processors: 133MHz (C33), 166MHz (C65), 200MHz (C73)
- 16MB RAM standard, expandable to 128MB ■ 1.6GB (C33), 2GB (C65) or 2.5GB (C73) hard drive ■ 8X CD-ROM drive ■ 2MB video memory standard ■ 28.8K bps data/fax/voice modem ■ Windows® 95 software
- 3-year limited warranty with 1-year on-site repair



Aptiva C33.....	\$1999.00	CDW 73083
Aptiva C65.....	\$2449.00	CDW 73084
Aptiva C73.....	\$2899.00	CDW 73085



**CDW
BEST
BUY!**

Presario 7232 and 7240

- ▲ 120MHz (7232) or 133MHz (7240) Intel® Pentium® processor
- ▲ 8MB EDO RAM standard, 128MB maximum ▲ 1.6GB hard drive
- ▲ iX (7232) or 6X (7240) CD-ROM drive ▲ 28.8K bps data/fax modem with full-duplex speakerphone
- ▲ Scanner keyboard with Windows 95 keys (7232 only)
- ▲ Software: Microsoft® Windows 95 and more! ▲ 3-year limited warranty



Presario 7232.....	\$1299.00	CDW 72133
Presario 7240.....	\$1399.00	CDW 72137

The Intel Inside® Logo and Pentium® are Registered Trademarks of Intel Corporation

Visit our web site!

www.cdw.com

CDW



FIRST CHOICE!



Microsoft

Windows NT Server V4.0

The easiest network operating system for your most demanding business needs

- ◆ One platform for e-mail, file server, databases and communications
- ◆ Supports over 5000 hardware platforms ◆ Integrates seamlessly with existing systems, including Novell NetWare* ◆ Built-in Internet, Intranet and communications services ◆ Web services included: FrontPage and Internet Information Server ◆ Support for dial-up networking ◆ Supports any Web browser ◆ Distributed on CD-ROM

Server + 5 clients	\$738.94	CDW 73221
Server + 10 clients	\$1023.61	CDW 73222
Upgrade + 5 client licenses	\$379.04	CDW 73214
Upgrade + 10 client licenses	\$503.25	CDW 73218
Competitive upgrade + 5 client licenses	\$379.04	CDW 73215
Competitive upgrade + 10 client licenses	\$503.25	CDW 73217
Single client license, upgrade	\$16.92	CDW 73209
Single client license	\$34.08	CDW 73211



Call your CDW® Account Executive for Microsoft Windows NT Server V3.51!

NEED HELP WITH A VOLUME LICENSE?

CDW® has a Corporate Software Sales division dedicated to helping you choose the right volume licensing program. Our Account Executives are experts on licensing programs from major manufacturers such as Symantec, Lotus, Microsoft and more. To contact the Corporate Software Sales division direct, call 800-294-4239 (4CDW).

Exchange Server V4.0

E-mail server with integrated groupware

Microsoft Exchange Server integrates e-mail, group scheduling, electronic forms and groupware applications on a single platform that can be managed with a centralized, easy-to-use administration program. It is designed to make messaging easier, more reliable and more scalable for businesses of all sizes.

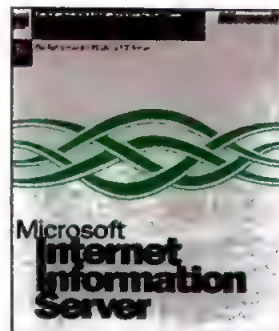


Exchange Server V4.0 with 5-client license	\$889.76	CDW 67483
Exchange Server V4.0 with 10-client license	\$1218.21	CDW 67397
Exchange Server V4.0 with 25-client license	\$1905.20	CDW 67629
Exchange V4.0 5-client access license	\$323.91	CDW 68139
Exchange V4.0 20-client license	\$1018.74	CDW 68140

Internet Information Server V1.0

The web server designed for Windows NT Server

Internet Information Server (IIS), is the first Web server integrated with the Microsoft NT™ Server operating system. IIS allows you to deploy Web sites on the Internet and within Intranets. Its integration with the Microsoft BackOffice™ family of products helps you develop a new generation of Web



applications and can make thousands of existing database and messaging applications "Web-enabled" today. Combining Internet Information Server with Windows NT Server provides a foundation that works with the systems you have now and the technology that will support you in the future.

\$89.87 CDW 66441

Network Value Pack **\$889.15** CDW 66175

* Includes: Windows NT Server, Internet Information Server + 10 client access licenses

CDW® sells for less and services you better!™

800-998-4239 (4CDW)

CDW® carries hundreds of software titles. Call today.

COMPUTER DISCOUNT WAREHOUSE™



Jaz™ drive

The unlimited personal hard drive

Simply plug Omega's Jaz drive into a SCSI port and you have a second hard drive with a full gigabyte of capacity instantly. Unlimited storage space is yours by simply adding disks as needed.

- ◆ 12ms average seek time; up to 6.6MB per second sustained transfer rate
- ◆ Burst transfer rate: 10MB/sec.
- ◆ Buffer size: 256KB read/write
- ◆ Interface: Fast SCSI-2
- ◆ 1-year limited warranty



Internal.....	\$399.00	CDW 62710
External.....	\$499.00	CDW 58389
1GB Jaz disk PC.....	\$124.00	CDW 62711

Free Novell 11p-In-Date personal organizer software on CD when you register your new Omega Zip, Jaz or Dito drive. Offer fulfilled via manufacturer coupon. Offer valid 8/1/96-1/31/97.

WHY PAY RETAIL?

CDW Sells For Less!

TEXAS INSTRUMENTS TravelMate 6020 and 6030

Setting the standard in high performance and flexibility

- ◆ 120MHz (TM6020) or 133MHz (TM6030) Intel Pentium® processor
- ◆ 8MB (TM6020) or 16MB (TM6030) RAM standard
- ◆ 1.08GB (TM6020) or 1.35GB (TM6030) hard drive
- ◆ Optional integrated 6X CD-ROM drive
- ◆ 11.3" (TM6020) or 12.1" (TM6030) TFT active-matrix SVGA color display
- ◆ 28.8K bps modem

TM6020 **\$4041.95** CDW 70635

TM6030 **\$4806.26** CDW 70837



The Intel Inside® Logo and Pentium® are Registered Trademarks of Intel Corporation

HARDWARE, SOFTWARE & PERIPHERALS AT DISCOUNT PRICES

NETWORKING PRODUCTS

Novell

5-user CD.....	715.60
10-user CD.....	1519.15
25-user CD.....	2391.71
50-user CD.....	3231.25
100-user CD.....	4509.48

NetWare 3.12

5-user 3.5".....	699.03
10-user 3.5".....	1574.17
25-user 3.5".....	2325.28
50-user 3.5".....	3231.25
100-user 3.5".....	4509.48

GroupWise V4.1

Multilingual client/admin CD.....	471.75
5-user license.....	93.91
5-user license.....	487.29
25-user license.....	2337.53
50-user license.....	3577.01

ManageWise V2.0

10-user CD.....	875.82
50-user CD.....	1852.58
100-user CD.....	2642.32

LAN WorkPlace V5.0

Single-user CD.....	169.52
10-user CD.....	1344.42
100-user CD.....	4678.57

Microsoft

Version upg CD.....	686.74
Comp upg CD.....	1539.90
Full version CD.....	1958.91
5-client license.....	1159.88
20-client license.....	3697.84

Windows NT Server V3.51

Server upg CD.....	628.03
Server CD.....	622.50
Network Value Pack upg.....	754.69
Network Value Pack w/retail into Server.....	889.15
Single-client license.....	37.85
20-client license.....	503.27

Windows NT Server V4.0

Upg + 5-client license CD.....	379.04
Upg + 10-client license CD.....	379.05
Comp upg + 5-client license CD.....	379.05
Comp upg + 10-client license CD.....	503.25
Server + 5-client license CD.....	738.94
Server + 10-client license CD.....	1023.61
Single-client license.....	16.92
20-client license.....	34.08

Microsoft SQL Server V6.5

Server + 5-client license CD.....	1225.23
Server + 10-client license CD.....	1761.65
Server + 25-client license CD.....	2516.50
5-client license.....	663.76
20-client license.....	2084.26

Microsoft Systems Mgmt Server V1.0

SMS Server CD.....	579.18
SMS Server upg CD.....	583.18
Single-client license.....	48.14
20-client license.....	718.04

Microsoft SNA Server V2.11

SNA Server CD.....	359.59
Single-client license.....	55.37
20-client license.....	861.40

Microsoft Exchange Server V4.0

Server + 5-client license CD.....	829.71
Server + 10-client license CD.....	1218.21
Server + 25-client license CD.....	1899.72

3Com

3C900 EtherLink XL PCI 10BT.....	112.20
3C900 EtherLink XL PCI 10BT 5-pack.....	514.60
3C900 EtherLink XL PCI combo.....	132.85
3C900 EtherLink XL PCI combo 5-pack.....	587.10
3C905 Fast EtherLink XL PCI 10/100BT.....	137.01
3C905 Fast EtherLink XL PCI 10/100BT 5-pack.....	606.67
SuperStack II Hub 12-port 10BT.....	506.93
SuperStack II Hub 24-port 10BT.....	866.77
SuperStack II Hub 12-port 100BT.....	1629.99
SuperStack II Hub 48-port 100BT.....	5976.64
SuperStack II Switch 1000 12-port Enet.....	2489.74
SuperStack II Switch 1000 24-port Enet.....	3115.96
SuperStack II Hub TR 12-port.....	1192.51
SuperStack II Switch 2000 TR 12-port.....	5349.47

NETWORKING PRODUCTS

Artisoft

LANtastic V7.0.....	245.54
Add-on kit 3.5" + CD.....	128.53
1-user comp upg CD.....	57.36
10-user comp upg CD.....	232.51

ModemShare V7.0

1 shared port, unlimited users.....	87.91
4 shared ports, unlimited users.....	291.24
32 shared ports, unlimited users.....	1569.24

Bay Networks

BayStack 12-port hub 10BT.....	592.16
BayStack 24-port hub 10BT.....	918.71
BayStack 12-port hub 100BT.....	1553.32

COMPAQ

Netelligent 10BT PCI controller.....	103.31
Netelligent 10/100BT PCI controller.....	139.05
Netelligent 2000 8-port 10BT repeater.....	484.30
Netelligent 2000 16-port 10BT repeater.....	579.46

Intel

EtherExpress 16 10BT.....	103.19
EtherExpress 16 10BT 5-pack.....	458.76
EtherExpress 16 combo.....	121.25
EtherExpress 16 combo 5-pack.....	542.71
EtherExpress PRO/10-Mbps ISA.....	98.23
EtherExpress PRO/100Mbps PCI.....	131.64
EtherExpress PRO/100Mbps EISA.....	249.94
EtherExpress PRO/100Mbps PCI 5-pack.....	606.95
NetPortExpress EL Ethernet.....	373.30
TokenExpress PRO ISA LAN adapter.....	242.73

LINKSYS

Combo Ether16 LAN card.....	35.39
Combo EtherPCI LAN card.....	79.02
Combo PC/Ethernet card 10BT.....	104.62
PC Card LANmodem 10BT.....	339.85

SMC

EtherEZ coax ISA.....	91.63
EtherEZ 10BT ISA.....	92.03
EtherEZ combo.....	104.81
EtherPower 10BT PCI.....	117.39
EtherPower 10/100BT PCI.....	143.61
EtherPower coax ISA.....	148.83

DATA STORAGE

EXA

Eagle96 TBU internal.....	162.30
Eagle TR-3 3.2GB TBU internal.....	247.12
EXB-8700LT 5/10GB TBU external.....	1046.11

COLORADO

Jumbo 350 350MB TBU internal.....	59.70
Jumbo 1400 1.3GB TBU internal.....	190.00
Trakker 350MB TBU parallel.....	159.12
T1000E 800MB TBU parallel.....	189.68

iomega

Zip drive 100MB parallel.....	199.00
Zip drive 100MB SCSI.....	199.00
Ditto Easy 800MB Travan internal.....	119.00
Ditto Easy 800MB Travan external.....	149.00
Jaz drive 1GB internal SCSI-2.....	399.00
Jaz drive 1GB external SCSI-2.....	499.00
Jaz drive 1GB cartridge.....	124.00

Pinnacle

10XTREME 10X CDR internal.....	232.71
10XTREME 10X CDR recorder internal.....	841.20
Red 5040 2X CDR recorder external.....	942.73
Verax 2 6GB optical hard drive internal.....	1311.55
Verax 2 6GB optical hard drive external.....	1313.80

DATA STORAGE

SyQuest

EZ135 135MB IDE internal.....	119.23
EZ135 135MB SCSI external.....	119.23
EZ135 135MB external.....	119.23
EZ135 135MB cartridge.....	19.45
EZ135 230MB SCSI external.....	291.47
EZ135 230MB external.....	291.47
EZ135 230MB cartridge.....	29.18

MULTIMEDIA

ADS TV Superscan 2 PC to TV converter.....	292.20
Connectix QuickCam for Windows.....	98.05
Connectix Color QuickCam for Windows.....	209.44
EXP 8X CD w/remote port PCMCIA.....	733.30
EXP 8X CD w/remote module PCMCIA.....	859.51
Microolutions 4X CD parallel.....	219.67
Microolutions 8X CD w/remote parallel.....	359.58
Microolutions 8X CD parallel.....	337.55
Micro Solutions Snappy video still capture.....	181.98
NEC 4x4 4X CD 4-disc changer internal.....	99.00
NEC 4x4 4X CD 7-disc changer external.....	342.15
NEC 6X 6X CD external.....	243.82
NEC 6X 6X CD external.....	335.65
NEC 8V 8X CD internal IDE.....	153.71
NEC 8X 8X CD internal SCSI-2.....	341.76
NEC 8X 8X CD external SCSI-2.....	449.51
Panasonic portable 4X CD SCSI.....	399.00
Sony portable 4X CD Discman.....	347.46
Sony MoonStar 6X CD portable.....	259.37
Sony MoonStar 8X CD internal IDE/ATAPI.....	161.12
Sony MoonStar 8X CD portable.....	271.88

INPUT DEVICES

ALPS

Desktop GlidePoint.....	61.58
GlidePoint Windows 95 keyboard.....	87.19

EPSON

PhotoPC digital camera.....	499.00
ActionScanning System II.....	403.27
ES1000C color scanner.....	539.86
ES1200C Pro color scanner.....	1134.01

HEWLETT PACKARD

HP ScanJet 4x desktop scanner.....	184.27
HP ScanJet 4x flatbed scanner.....	468.08
HP ScanJet 4x flatbed scanner.....	894.09
HP ScanJet 4x document feeder.....	453.97

Kodak

DC20 Digital Science Camera.....	329.00
DC40 Digital Science Camera.....	599.00
DC50 Digital Science Camera.....	999.00

MouseMan

MouseMan 96.....	49.17
Cordless MouseMan.....	67.44
TrackMan Marble.....	75.51
TrackMan Live! cordless pointer.....	109.40
PageScan color scanner.....	305.55

MICROTEK

PageWiz compact scanner.....	114.69
ScanMaker E3 color flatbed.....	349.81

UMAX

Vista-SOE SOHO scanner.....	368.06
Vista-S12 scanner.....	796.86

VISIONEER

PaperPort Vx scanner.....	257.45
PaperPort ix scanner.....	297.24

MONITORS

Mag Innovation DX1585 PnP 15" 26mm.....	359.58
Mag Innovation DX1575 PnP 15" 26mm.....	312.61
Mag Innovation DX1571 17" 26mm.....	384.49
Mag Innovation DX1571 17" 26mm.....	668.51
Mag Innovation MXP17F 17" 26mm.....	713.22
Mag Innovation MX21F 21" 26mm.....	1484.25
Magnavox CM20914" 25mm.....	252.29
Magnavox CM2015 15" 25mm.....	329.19
Magnavox CM1215 15" 25mm.....	342.50
Magnavox CM4018 17" 25mm.....	599.50
Magnavox 20CM64 20" 31mm.....	924.01
NEC C400 14" 28mm.....	308.75
NEC XV15+ 15" 28mm.....	473.13
NEC M500 15" 25mm.....	526.24
NEC XV17+ 17" 28mm.....	799.84
NEC XE21 21" 28mm.....	1679.48
NEC XP21 21" 28mm.....	1943.57
Samsung 17GL 17" 26mm.....	759.00
Samsung 17GL 17" 26mm.....	929.00
Sony Multiscan 1561 15" PnP 25mm.....	395.63
Sony Multiscan 1561 15" PnP 25mm.....	469.90
Sony Multiscan 1761 17" PnP 25mm.....	775.83
Sony Multiscan 1761 17" PnP 25mm.....	976.41
Sony Multiscan 2061 20" PnP 30mm.....	1635.53
ViewSonic 15GS 15" 27mm.....	385.06
ViewSonic 17GS 17" 27mm.....	616.79
ViewSonic 17GS 17" 27mm.....	1494.55
ViewSonic PB10 21" 25mm.....	1579.94
ViewSonic PB15 21" 25mm.....	1858.06
ViewSonic PT810 21" 30mm.....	1579.28

VIDEO BOARDS

ATI 3D Xpresson PCI 2MB.....	147.90
ATI Graphics Xpresson PCI 2MB.....	94.71
ATI Graphics Xpresson ISA 2MB.....	93.68
ATI Graphics Pro Turbo PCI 2MB.....	226.03
ATI Graphics Pro Turbo PCI 4MB.....	315.66
ATI Video Xpresson PCI 2MB.....	116.69
Diamond Stealth64 2120 PCI 1MB.....	91.37
Diamond Stealth64 Video 3240X PCI 2MB.....	222.72
Matrox Millennium PCI 2MB VRAM.....	252.29
Matrox Millennium PCI 4MB VRAM.....	377.00
Matrox Millennium PCI 2MB VRAM.....	168.57

OVERDRIVE PROCESSORS

intel

Intel OverDrive DX4/75.....	138.66
Intel OverDrive DX4/100.....	178.74
Intel OverDrive Pentium 63MHz.....	138.66
Intel OverDrive Pentium 83MHz.....	189.27
Intel OverDrive Pentium 100MHz up to 5/75.....	259.24
Intel OverDrive Pentium 150MHz up to 5/90.....	319.20
Intel OverDrive Pentium 160MHz up to 5/100.....	469.14

PC CARDS

3Com Etherlink IIC	138.98
3Com Etherlink III 28.8 Enet 10BT	414.30
Adaptec APA1460 SCSI-2	185.15
Hayes EZJack 14.4 w/tx	163.46
Hayes EZJack V.34 28.8 w/tx	219.00
IBM 14.4 modem	39.39
IBM ethernet adapter 10BT	122.46
IBM 28.8 data/fax modem	265.75
IBM Token Ring 16/4	297.53
Megahertz 10BT Enet adapter w/JACK	122.07
Megahertz 28.8 V.34 data/fax w/JACK	242.75
Megahertz 28.8 V.34 cellular w/JACK	244.80
Megahertz 28.8 Enet cellular w/JACK	318.58
Megahertz 28.8 Enet combo cellular w/JACK	342.44
Megahertz APoints	464.12
Motorola Montana 28.8 cellular	231.95
New Media 28.8 NetSurfer fax/modem	122.46
Simple 14.4 modem + voice	82.57
Simple 28.8 Communicator cellular	168.17
Simple 28.8 Communicator	247.70
SMC EtherEZ 10BT	122.46
SMC EtherEZ modem	169.68
USR Sportster V.34 28.8 with DataView	199.65
Xircom Ethernet 10BT	139.23
Xircom Ethernet modem	172.57
Xircom Ethernet modem 28.8 10BT	311.11
Xircom Ethernet+modem 28.8 compo	339.00

Optra R+

Affordable, 1200 dpi desktop laser printer

- 300 or 600 dpi, with PQET, 16 ppm print speed
- True 1200 x 1200 dpi, 8 ppm print speed • 4MB RAM
- standard, upgradeable to 64MB • 25MHz AMD 29030
- CPU • Enhanced PCI+ 5, PostScript™ Level 2 emulations • 1-year LexExpress Warranty

Optra R+ **\$1253.62** CDW 69073

Optra R+ **\$1481.54** CDW 69074

WHY SETTLE FOR LESS?

CDW SERVICES YOU BETTER!

CDW CARRIES OVER 20,000 PRODUCTS. IF YOU DON'T SEE IT, CALL!

Novell
Everything's Connected

GroupWise V4.1
Not just e-mail!

Novell® GroupWise™ V4.1 is a fully-integrated e-mail, calendaring, scheduling and task management application. Now you can send messages, schedule meetings, and assign and track vital tasks across an entire enterprise - including WAN configurations and dissimilar messaging systems.

Win/Mac/DOS client/DOS admin...	\$471.75	CDW 65721
1 add'l license	\$93.91	CDW 68615
5 add'l licenses	\$487.29	CDW 71448
25 add'l licenses	\$2337.53	CDW 71447

COMPUTERS

TOSHIBA

Satellite & Satellite Pro Notebooks

100CS 5/75 8MB 500MB 10.4" dual	1539.77
110CS 5/100 8MB 810MB 11.3" dual	1939.75
110CS 5/100 8MB 810MB 11.3" active	2469.07
410CS 5/90 8MB 772MB 11.3" dual	2274.62
410CST 5/90 8MB 772MB 11.3" active	2739.39
420CDS 5/100 8MB 810MB 11.3" dual	2489.30
420CST 5/100 8MB 810MB 11.3" active	3289.82

Portable Notebooks

610CST 5/90 8MB 772MB 9.5" active	2429.66
510CST 5/133 16MB 1.2GB 11.3" active	4339.19

Tecra Notebooks

500CS 5/120 16MB 1.2GB 12.1" dual	3857.56
500CST 5/120 16MB 1.2GB 12.1" active	4519.30
720CST 5/133 16MB 1.2GB 12.1" active	5289.11
730CST 5/150 16MB 2GB 12.1" active	6002.37

AST

Ascendia Notebooks

J10 5/75 8MB 500MB 10.4" dual	1979.47
J20 5/100 8MB 540MB 11.3" dual	1736.97
J30 5/100 8MB 800MB 10.4" dual	2326.86
J40 5/100 8MB 800MB 10.4" active	2808.50
510 5/133 8MB 800MB 10.4" active	3275.85
P30 5/100 8MB 800MB 11.3" dual 4X CD	2089.46
P40 5/100 8MB 1.2GB 11.3" dual 4X CD	2596.09
P40 5/120 16MB 1GB 11.3" active 6X CD	3287.93
P40 5/120 16MB 2GB 11.3" active 6X CD	3749.59
P50 5/133 8MB 800MB 11.3" active 4X CD	3921.72
P50 5/133 8MB 1.2GB 11.3" active 4X CD	4346.19
P50 5/133 24MB 1GB 12.1" active 6X CD	4217.73
P50 5/133 24MB 2GB 12.1" active 6X CD	4676.95

Advantage Lifestyle Mini-towers

9312 5/166 16MB 2GB 8X CD	2446.84
9310 5/166 24MB 2GB 8X CD	2351.84
9315 5/166 32MB 2GB 8X CD	2633.84
9316 5/200 32MB 3GB 8X CD	2921.44

Advantage 9300 Series Mini-towers

9304 5/133 24MB 1GB 8X CD	1859.53
9308 5/166 24MB 2GB 8X CD	2073.30
9314 5/200 24MB 4GB 8X CD	2633.84

Bravo Desktops

LC 5100 5/100 8MB 630MB	1167.46
LC 5100 5/100 16MB 1.2GB	1552.16
LC 5133 5/133 8MB 630MB	1283.52
LC 5133 5/133 16MB 1.2GB	1375.74
LC 5166 5/166 16MB 1.2GB	1704.60
MS 5100 5/100 8MB 630MB	1324.88
MS 5100 5/100 16MB 1.2GB	1488.05
MS 5133 5/133 8MB 1.2GB	1499.11
MS 5133 5/133 16MB 1.2GB	1609.74
MS 5166 5/166 16MB 2GB	2184.77

Bravo Mini-towers

MS-T 5100 5/100 16MB 1.2GB	1399.54
MS-T 5100 5/100 16MB 2GB	1543.36
MS-T 5133 5/133 16MB 2GB	1554.43
MS-T 5133 5/133 16MB 2GB	1707.66

COMPAQ

Armada Notebooks

1120 5/100 8MB 810MB 10.4" dual	1888.23
1120T 5/100 8MB 810MB 10.4" active	2208.02
4110 5/100 8MB 810MB 11.3" dual	2496.17
4110D 5/100 8MB 810MB 11.3" dual	2879.37
4120 5/120 16MB 1.0GB 11.3" dual	3072.47
4120T 5/120 16MB 1.0GB 11.3" active	3744.82
4130T 5/133 16MB 1.2GB 11.8" active	4417.17

LTE 5000 Series Notebooks

5000 5/75 8MB 810MB 10.4" active	3648.77
5100 5/90 8MB 810MB 10.4" active	4032.97
5100 5/90 8MB 810MB 10.4" active 2X CD	4417.17
5150 5/100 8MB 810MB 11.3" dual	2879.37
5200 5/120 8MB 1.35GB 10.4" active	4801.37
5250 5/120 16MB 1.0GB 10.4" active	3648.77
5280 5/120 16MB 1.3GB 11.3" active	4417.17
5300 5/133 16MB 1.3GB 12.1" active	4801.37
5380 5/133 16MB 2.1GB 12.1" active	5781.87

Desktop 5000 Series Desktops

5100/630 5/100 8MB 630MB	1118.70
5100/1200 5/100 8MB 1.2GB	1282.55
5100/1200 5/100 16MB 1.2GB	1384.25
5120/1200 5/120 8MB 1.2GB	1401.20
5120/1200 5/120 16MB 1.2GB	1502.90
5133/1200 5/133 16MB 1.2GB	1855.45
5133/2500 5/133 16MB 2.5GB	1858.85
5166/1200 5/166 16MB 1.2GB	1966.20
5166/2500 5/166 16MB 2.5GB	2189.60
6200/2500 5/200 32MB 2.5GB	2768.50
6180/1200CD 6/180 16MB 1.2GB 8X CD	2542.50
6200/2500CD 6/200 16MB 2.5GB 8X CD	3152.70

COMPUTERS

COMPAQ

Desktop 2000 Series Mini-towers

5133/2500CD 5/133 16MB 2.5GB 8X CD	2073.55
5166/2500CD 5/166 32MB 2.5GB 8X CD	2621.60
6200/2500CD 6/200 32MB 2.5GB 8X CD	3406.95

Desktop 4000 Series Desktops

5120/1080 5/120 16MB 1.0GB	1627.20
5120/1620LS 5/120 16MB 1.62GB	1875.80
5133/1080 5/133 16MB 1.0GB	1808.00
5133/1620 5/133 16MB 1.62GB	1875.80
5200/1080CDS 5/200 32MB 1.0GB 8X CD	2519.95
5166/2500LS 5/166 16MB 2.5GB	2508.60
6180/1620CDS 6/180 32MB 1.62GB	3051.00
6200/2500LS 6/200 32MB 2.5GB	3638.60

Desktop 4000 Series Mini-towers

5133/1620LS 5/133 32MB 1.62GB	2309.85
5166/2500CDS 5/166 32MB 2.5GB	2881.50

Desktop 6000 Series Desktops

5166/1080CDS 5/166 16MB 1.0GB 8X CD	2847.60
5166/1080CDS 5/166 32MB 1.0GB 8X CD	3107.50
5200/1080CDS 5/200 32MB 1.0GB 8X CD	3813.75
6180/2150CDS 6/180 32MB 2.15GB 8X CD	3983.25
6200/4200POS 6/200 32MB 4.2GB PD-CD	4847.70

Desktop 6000 Series Mini-towers

5166/2150CDS 5/166 32MB 2.15GB 8X CD	3519.95
6200/4200POS 6/200 32MB 4.2GB PD-CD	4881.60

IBM

ThinkPad Notebooks

365ED 5/100 8MB 540MB 10.4" dual 4X CD	1969.00
365X 5/100 8MB 810MB 10.4" dual	1999.00
365X 5/100 8MB 810MB 10.4" active	2339.05
365XD 5/100 8MB 810MB 10.4" dual 4X CD	2306.10
365XD 5/120 8MB 1GB 11.3" dual 4X CD	2465.30
365XD 5/120 8MB 1GB 10.4" active 4X CD	2887.21
560 5/100 8MB 810MB 11.3" dual	2761.79
560 5/120 8MB 810MB 12.1" active	3743.78
560 5/133 8MB 1GB 12.1" active	4195.15
760E 5/120 8MB 810MB 12.1" active	4399.05
760E 5/120 8MB 1.2GB 12.1" active	4427.71
760E 5/133 16MB 1.0GB 12.1" active	5947.85
760ED 5/133 16MB 1.2GB 12.1" active 4X CD	6994.98
760EL 5/100 8MB 810MB 11.3" dual	3258.44
760ELD 5/100 8MB 810MB 11.3" dual 4X CD	4459.78
760EL 5/120 8MB 810MB 11.3" dual	3409.81
760EL 5/120 8MB 1.0GB 12.1" active	4392.50
760EL 5/133 16MB 1.0GB 12.1" active	5497.32

Apstra Series Desktops

C35 5/133 16MB 1.6GB 8X CD	1999.00
C65 5/166 16MB 2GB 8X CD	2449.00
C73 5/200 16MB 2.5GB 8X CD	2899.00

PC300 Series Desktops

PC330 5/133 16MB 1.2GB 3 bays	1739.91
PC330 5/133 16MB 1.6GB 3 bays	1808.89
PC340 5/100 16MB 1.2GB 4 bays	1369.82
PC340 5/133 16MB 1.2GB 4 bays	1597.85
PC350 5/100 16MB 1.2GB 5 bays	1549.15
PC350 5/133 16MB 1.2GB 5 bays	1775.70
PC350 5/133 16MB 1.6GB 5 bays	1839.39
PC350 5/133 16MB 1.6GB 5 bays 6X CD	1918.10
PC350 5/166 16MB 1.6GB 5 bays	2146.32

PC700 Series Desktops

PC700 5/100 16MB 1.2GB 5 bays	1654.37
PC700 5/133 16MB 1.2GB 5 bays	1915.19
PC700 5/166 16MB 1.2GB 5 bays	2542.16

NEC

Versa Notebooks

2400 5/100 8MB 810MB 11.3" dual	2299.00
2400CD 5/100 16MB 1GB 11.3" dual 6X CD	2699.00
4200 5/100 8MB 810MB 10.4" active	2999.00
4230 5/133 8MB 810MB 10.4" active	3899.00
4050H 5/90 8MB 810MB 10.4" active	2999.00
4080H 5/100 8MB 1GB 10.4" active	3699.00
6000H 5/100 16MB 1.0GB 11.3" active 6X CD	3999.00
6000H 5/133 16MB 1.3GB 12.1" active 6X CD	4999.00
6030X 5/133 16MB 1.4GB 12.1" active 6X CD	5399.00

Extensa Notebooks

510 5/100 8MB 810MB 10.4" dual	1739.77
555CD 5/75 8MB 500MB 10.4" dual	1954.90
560CST 5/75 8MB 1.2GB 10.4" active 4X CD	2412.45
570CST 5/75 8MB 1.0GB 11.3" dual 6X CD	3244.27
570CST 5/100 8MB 1.2GB 10.4" active 4X CD	2804.07

PRINTERS

TEXAS INSTRUMENTS

Travelmate Notebooks

TM5100 5/90 8MB 1.2GB 10.4" active	2572.81
TM5200 5/120 8MB 1.2GB 11.3" active	2894.07
TM5300 5/133 8MB 1.2GB 11.3" active	3279.37
TM6020 5/120 8MB 1.0GB 11.3" active	4041.95
TM6030 5/133 16MB 1.3GB 12.1" active	4806.26

HEWLETT PACKARD

Vectra 900 Series Desktops

510CD 5/120 16MB 1.2GB 8X CD	1616.99
------------------------------	---------

Vectra 500 Series Mini-towers

515CCX 5/120 16MB 1.2GB 6X CD	1819.45
515CD 5/133 16MB 1.62GB 6X CD	1828.75
515MCC 5/133 16MB 1.62GB 6X CD	2064.29
515MCC 5/150 16MB 1.62GB 6X CD	2174.31
515MCC 5/166 16MB 1.62GB 6X CD	2353.28

PRINTERS

Canon

BJJ0 monochrome	265.50
BJC70	293.88
BJC210	149.00
BJC610	429.00
BJC4100	229.00

EPSON

AP5000+	216.01
DX5000+	1385.48
FX18000	2333.18
FX870	289.45
FX1170	376.56
LO870	443.03
LO1070+	388.60
LO2170	599.00

HEWLETT PACKARD

HP Deskjet 400	196.56
HP Deskjet 340 portable	293.84
HP Deskjet 682C color printer	299.00
HP Deskjet 820C color printer	549.00
HP LaserJet 5P	801.83
HP OfficeJet inkjet fax/copier/printer	494.03
HP OfficeJet 350 inkjet fax/copier/printer/scanner	549.00
HP LaserJet 5LX	479.00

LEXMARK

4030 10 Plus	1037.81
Optra E	542.17
Optra LX+	1648.39
Optra N	2754.83
Optra R+	1253.62
Optra LX+	1481.54

OKIDATA

184 Turbo	228.28
320 Turbo	317.15
321 Turbo	445.72
ML395	1005.83
ML590	981.94
ML521	509.02
ML590	445.72
ML591	603.87
Okupage 4w	209.00
OL600e	399.00
OL610e/PS	893.96
OL810e	755.42

Panasonic

1150	134.97
2023	182.70
2130	204.29
KX-P6500 Laser	448.89

TEXAS INSTRUMENTS

microLaser Pro6	1103.88
microLaser PowerPro72	1359.39

HARD DRIVES & CONTROLLERS

Seagate

631MB Fast-ATA	165.94
1.0GB Fast-ATA2	206.84

HARD DRIVES & CONTROLLERS

Seagate

SERVICE



MagiPro PRO 200

- Intel 200Mhz Pentium Pro Processor
- 256K Cache
- 32MB EDO RAM
- 2 Gig EIDE Hard Drive
- Matrox Millenium PCI Video w/2MB WRAM
- 8X CD ROM Drive
- 3.5" 1.44 Floppy Drive
- 16-Bit Soundcard/Speakers
- 17" Princeton SVGA Monitor
- Midtower Case w/230 watt Power Supply
- Maxiswitch 104 Keyboard/Logitech PS2 Mouse
- Microsoft Windows NT Workstation
- Microsoft Office Pro 95 w/Bookshelf

\$3,109

MagiPro OFFICE

- Intel Pentium Processor
 - 512K Pipeline Burst Cache
 - 16MB EDO RAM
 - 2.0 Gig EIDE Hard Drive
 - 64-Bit PCI Graphics Accelerator w/2MB
 - 8X CD ROM Drive
 - 3.5" 1.44 Floppy Drive
 - 16-Bit Soundcard/Speakers
 - 14" Princeton SVGA Monitor
 - Midtower Case w/230 watt Power Supply
 - Maxiswitch 104 Keyboard/Logitech PS2 Mouse
 - Microsoft Windows 95
 - Microsoft Office Pro 95 w/Bookshelf
- | | |
|----------------------------|----------------|
| w/100Mhz Pentium Processor | \$1,439 |
| w/133Mhz Pentium Processor | \$1,529 |
| w/166Mhz Pentium Processor | \$1,699 |
| w/200Mhz Pentium Processor | \$1,840 |

MagiPro MULTIMEDIA INTERNET

- Intel Pentium Processor
 - 512K Pipeline Burst Cache
 - 16MB EDO RAM
 - 2 Gig EIDE Hard Drive
 - 64-Bit PCI Graphics Accelerator w/2MB
 - 8X CD ROM Drive
 - 3.5" 1.44 Floppy Drive
 - 16-Bit Soundcard/Speakers
 - 33.6 Voice Fax Modem w/Duplex Speakerphone
 - 15" Princeton SVGA Monitor
 - Minitor Case w/230 watt Power Supply
 - Maxiswitch 104 Keyboard/Logitech PS2 Mouse
 - Microsoft Windows 95
 - MS Works, Encarta, Golf, Dangerous Creatures
- | | |
|----------------------------|----------------|
| w/100Mhz Pentium Processor | \$1,489 |
| w/133Mhz Pentium Processor | \$1,579 |
| w/166Mhz Pentium Processor | \$1,745 |

MagiPro MULTIMEDIA

- Intel Pentium Processor
 - 256K Pipeline Burst Cache
 - 16MB EDO RAM
 - 1.6 Gig EIDE Hard Drive
 - 64-Bit PCI Graphics Accelerator w/1MB
 - 8X CD ROM Drive
 - 3.5" 1.44 Floppy Drive
 - 16-Bit Soundcard/Speakers
 - 14" Princeton SVGA Monitor
 - Minitor Case w/230 watt Power Supply
 - Maxiswitch 104 Keyboard/Logitech PS2 Mouse
 - Microsoft Windows 95
 - MS Works, Encarta, Golf, Dangerous Creatures
- | | |
|----------------------------|----------------|
| w/100Mhz Pentium Processor | \$1,219 |
| w/133Mhz Pentium Processor | \$1,309 |
| w/166Mhz Pentium Processor | \$1,479 |
| w/200Mhz Pentium Processor | \$1,635 |

HARD DRIVES

1.2 Gigabyte	\$185
1.6 Gigabyte	\$209
2 Gigabyte	\$239

NETWORKING

16 bit Ethernet Adapter	\$29
PCI Ethernet Adapter	\$55
8 Port Ethernet Hub	\$99

PRINTERS

Hewlett Packard 680C	\$309
Hewlett Packard 870CX	\$475
Hewlett Packard 5L	\$459

800-478-2252

Custom Configurations Available-Call for a Personalized Quote
9am-7pm Weekdays & 11am-4pm Weekends (CST)

8421-S East 61st Street, Tulsa, OK 74133

Phone 918-459-2500

Fax 918-459-0263

Visa, MasterCard, Discover, AmEx, COD, Purchase Orders

<http://www.webtek.com/magipro>

MAGIPRO
COMPUTERS

```
@ECHO OFF
REM - MkZip.Bat - creates a new ZIP containing files
REM - dropped on it
cls
if NOT (%1) goto parmOK
Echo -
Echo - Drop files and folders onto this icon
ECHO - to create a ZIP archive named...
Echo - %TEMP%\ZIP\NewZip.ZIP (or NewNewZip.ZIP, etc)
Echo -
Pause
Exit

:parmOK
If Not Exist %TEMP%\ZIP\NUL Mkdir %TEMP%\ZIP
If Exist %TEMP%\ZIP\TempOnly.ZIP Del
    %TEMP%\ZIP\TempOnly.ZIP

REM if it's a directory, use -r -p and add all of its
REM files and dirs otherwise, it's a file so just add it
REM to the archive

:addFiles
if exist %1\NUL pkzip.exe -r -p
```

```
%TEMP%\ZIP\TempOnly.ZIP %1*. *
if Not Exist %1\NUL pkzip.exe
%TEMP%\ZIP\TempOnly.ZIP %1
shift
if NOT (%1) goto addFiles

REM PKZip truncates output filename to old style 8.3
REM filename, so we zip to a short one (above) then
REM rename.
REM Create a unique name by prefixing "New" until
REM there's no match

set UNIQFILE=NewZip.ZIP
:tryAgain
if not exist "%TEMP%\ZIP\%UNIQFILE%" goto RenameIt
set UNIQFILE=New%UNIQFILE%
goto tryAgain

:RenameIt
Ren %TEMP%\ZIP\TempOnly.Zip %UNIQFILE%

explorer /e,/Select,%TEMP%\ZIP\%UNIQFILE%
exit
```



FIGURE 2: Drop a group of files or folders onto this batch file and it will archive them in a temporary .ZIP file.

handling multiple file and folder drops, and starting the Explorer with a preselected file.

DAN ROLLINS
La Crescenta, California

PC MAGAZINE: We've published other Windows 95 solutions for viewing .ZIP file contents and collecting files into a .ZIP archive, among them our ZipView and ZipDrop utilities. But these batch-file solutions are clever enough to merit another look, and the techniques they use will be useful in other drop-target batch files.

I made a few minor changes to VUZIPBAT so it can handle multiple .ZIP files. If you drop three or four .ZIP files on VUZIPBAT, it will display each in turn and ask whether you want to unzip it. All the files will be dumped into the same ZIPPED directory below your TEMP directory, and they won't be displayed in Explorer until all the .ZIP files have been processed. As Mr. Rollins noted in the discussion of MKZIPBAT, however, the number of .ZIP files you can drop is limited by the length of the command line.

On the other hand, if you attach VUZIPBAT as the handler for .ZIP files and right-click after selecting several .ZIP files, each file will be processed in its own DOS box by its own copy of VUZIPBAT. Remember to move any unzipped files from the temporary directory before continuing with the next copy of VUZIPBAT.

The next-to-last line of MKZIPBAT uses an Explorer command-line switch that may not be familiar. The /select switch causes Explorer to view the parent folder of the specified

file or folder and highlight the file or folder itself. The /select switch is rarely used outside of batch files.

As noted above, any drop-target batch file will fail if you drop too many files on it. Windows 95 passes the list of files on the command line, and the command line's length is limited. The solution described above is a good one—drop files onto a temporary folder, then drop the folder onto the batch file. You need to be mindful of two things, though. First, if the files reside on the same drive as the temporary folder, the default Windows behavior is to move them. Hold the Ctrl key while dropping files on the temporary folder to ensure that Windows copies them rather than moving them. Second, remember that the temporary directory may contain files used in a previous operation. You'll probably want to delete existing files before adding new ones.

You can download the batch files mentioned here from PC Magazine Online. See the sidebar "Guide to Our Utilities" in this issue's Utilities column for instructions.

Simplify Exploring in Windows 95

I like "rooted" Explorer views and have found an easy way to put an Explore From Here command on the right-click menu of folders. First, open any Explorer window. Select View | Options and then click the File Types tab. Select Folder from the list and click Edit. In the resulting window, click New, and in the

Action box type "Explore From Here" (without quotation marks). Then, in the Application Used to Perform Action box, type "c:\windows\explorer.exe /e, /root," (be sure not to omit the final comma). Click OK a few times. Now when you right-click on a folder, Explore From Here will be a menu choice.

ADAM NOLLEY
Amherst, Virginia

PC MAGAZINE: Normally, when you start Explorer, the view is not rooted. That means you can navigate all the way back up to My Computer by repeatedly clicking the Up One Level button or pressing Backspace. In a rooted view, you can navigate only in and below the folder that's defined as the view's root. Many users find this kind of view easier to work with, as there's no chance of accidentally straying outside the root folder.

When a program needs to modify the right-click menu for a particular file type, it has to use some rather complicated OLE objects. But as this tip shows, adding right-click menu commands by hand is relatively painless and simple. You do need to avoid giving your added item the same name as an existing item: Windows 95 will seem to accept the new item, but the item will disappear once you close the Edit File Type dialog.

Try this tip on your own system and see how you feel about rooted Explorer views. If you don't like it, edit the Folder file type as described above, highlight Explore From Here, and click the Remove button. Confirm the removal, close all the dialogs, and the menu item is gone.



Call The PC Zone

- Brand names. Discount prices!
- Over 20,000 products
- Great customer service

Call for GREAT Prices on Notebooks and Desktops!

TOSHIBA **NEW!**

Tecra 500CS

- 120MHz Intel® Pentium® processor
- 16MB fast EDO RAM
- Optional 6X CD-ROM

AS LOW AS \$3639

Intel Inside Pentium

HITACHI

AS LOW AS \$1999

HITACHI E Series

- Up to 133MHz Intel® Pentium® processor
- Up to 16MB EDO RAM standard
- 11.3" DSCAN or TFT screen available
- Windows 95 pre-loaded

ViewSonic®
See The Difference™

17GS 17" Color Monitor
(16" viewable)

- Maximum resolution: 1280x1024
- .27mm dot pitch
- 3-year limited warranty

ONLY \$649.98
Circle #23486

HOTTEST PRICED LASER PRINTER!

One-Year Warranty

Hewlett-Packard Factory Reconditioned LaserJet 5P Printer

- 600x600 dpi resolution featuring REI and 120 levels of gray
- 4 ppm print speed
- Includes font management software

ONLY \$699.98
Order #86348

FREE Laptop Software

AS LOW AS \$1999
Call for prices

- Cyrix 5x86C 100/33MHz, 3.3 V CPU (ThinkPad 365E/ED)
- 100MHz & 120MHz Pentium® CPUs (ThinkPad 385X/XD)
- 8MB RAM, expandable to 24MB or 40MB
- 540MB to 1.08GB hard drives
- 10.4" to 11.3" displays
- Type III PCMCIA slot (one Type III or two Type II)
- Local Bus video with acceleration
- IR transceiver for wireless data transfer
- AND MORE

THE RIGHT TOOL FOR YOUR TRADE!

HP Vectra 500 Series

- Pentium® processor-based desktops and minitowers
- Cutting-edge communications capabilities
- Choose complete Microsoft or Claris software suites to boost business success
- Everything is integrated for you and backed by HP's unparalleled service and support - call for details!

AS LOW AS \$1189
Call for prices

Monitor sold separately

HARDWARE

COMPUTERS

IBM Aptiva	
36654 Aptiva/33 P133 16MB 1.6GB 8X CD MT	\$1,999.00
36654 Aptiva/35 P150 16MB 2.0GB 8X CD MT	\$2,099.00
36658 Aptiva/35 P166 16MB 2.0GB 8X CD MT	\$2,449.00
36660 Aptiva/35 P166 16MB 2.0GB 8X CD MT	\$2,449.00
36665 Aptiva/33 P200 32MB 3.2GB 8X CD MT	\$2,449.00

Packard Bell Platinum

34184 Platinum 40 P133 16MB 1.6GB 8X CD MT	\$1,199.00
34185 Platinum 60 P166 16MB 1.6GB 8X CD MT	\$2,199.00
34186 Platinum 70 P200 24MB 2.0GB 8X CD MT	\$2,199.00

AST Advantage

36710 Advantage 3304 P133 241 6GB 8X CD MT	\$1,499.00
36711 Advantage 3308 P166 240 5GB 8X CD MT	\$1,799.00
36714 Advantage 3310 P166 240 5GB 8X CD MT	\$1,799.00
36714 Advantage 3310 P166 240 5GB 8X CD MT	\$1,799.00
36715 Advantage 3314 P166 320 5GB 8X CD MT	\$1,799.00
36716 Advantage 3314 P166 320 5GB 8X CD MT	\$1,799.00
36716 Advantage 3314 P166 320 5GB 8X CD MT	\$1,799.00
36716 Advantage 3314 P166 320 5GB 8X CD MT	\$1,799.00

NOTEBOOKS

IBM Thinkpad 560		
33175	P100 8MB 810HD 11.3" DSCAN W/65	\$2,099.00
33177	P100 8MB 810HD 12" SVGA TFT W/65	\$1,799.00
33173	P133 8MB 10GB 12" SVGA TFT W/65	\$4,199.00
Texas Instruments		
32184	TMS300 P133 81 2GB 11.3" SVGA TFT	\$3,299.00
32185	TMS300 P166 81 2GB 11.3" SVGA TFT	\$2,999.00
32186	Extensio 5600CD P166 81 2 4cd 10.4 Active	\$2,999.00
33562	Extensio 5600CD P100 81 810HD 6CD DSCAN	\$2,299.00
33583	Extensio 5600CD P100 81 2GB 6CD 60 TFT	\$2,999.00

Your 24 Hour Computer Discount Catalog SuperStore



WordPerfect

Lotus

Microsoft

NEC

1-800-258-8088

TOSHIBA

AST

TEXAS INSTRUMENTS

Powerful Multimedia!

IBM Aptiva

- 133 to 200MHz Intel® Pentium™ processor
- Up to 3.2GB hard drive
- 8x CD-ROM drive
- 16MB to 32MB RAM standard
- Powerful, 30-watt speakers
- 28.8 fax/voice/data modem
- Advanced telephony center with full duplex line
- Lots of pre-installed software



AS LOW AS
\$1999
Order #36653

Monitor sold separately

Run with the Paq!



AS LOW AS
\$1899
Order #83720

COMPAQ
Compaq Armada Notebook Series

- 100 or 120MHz Intel® Pentium™ processor
- 8MB RAM, expandable to 24 or 40MB
- 810MB or 1.08GB hard drive



While Supplies Last!

Monitor sold separately

BLOWOUT!

ONLY \$1699
Order #36032

COMPAQ
PRESARIO 9240

- 133MHz Pentium™ chip
- 8MB RAM, expandable to 136MB
- 1.2GB hard drive
- 4X PC-CD rewritable CD-ROM drive

HARDWARE and SOFTWARE

CD-ROMS	
AddOnics	
27505	AddOnics Portable CD ROM Drive 4X \$199.00
27518	AddOnics Portable CD 4X/4W/16MB Sound \$359.00
30823	6X CD-ROM Drive \$299.00
30824	6X CD-ROM Drive with SoundCard \$519.00
Hi-VAL	
24804	Hi-VAL 4x SCSI CD Multimedia Upgr Kit \$149.00
26745	Hi-VAL 4x Ext SCSI \$189.00
28556	Hi-VAL 4x Upgrade Kit \$209.00
30323	Hi-VAL 4x IDE CD-ROM Kit Internal \$59.00
30346	Hi-VAL 4x IDE CD-ROM Kit External \$59.00
30347	Hi-VAL 8x IDE CD Kit \$109.00
32081	Hi-VAL 8x Int IDE \$99.00
Creative Labs	
30633	Vibra 6x CD-ROM Upgrade \$139.00
32063	Blaster CD 6x IDE \$149.00
30534	Vibra Value 6x CD-ROM \$245.00
30827	Sound Blaster Discovery CD 6x Int PnP \$339.00
30828	Sound Blaster Performance CD 6x Int PnP \$385.00
MicroSolutions	
31086	Sound Card Upgrade Kit For 4x CD Drive \$129.00
31079	Backpack Plug-and-Play 4x CD-ROM Drive \$259.00
31082	Backpack Plug-and-Play 6x CD-ROM Drive \$259.00
31090	Backpack PnP 4x CD Drive w/Sound Card \$299.00
31083	Backpack PnP 6x CD Drive w/Sound \$354.00
NEC	
31812	NEC MultiSync 4002 4X Internal \$99.00
28660	NEC MultiSync 4002 4X Changer 7Disc w/Case \$339.00
24216	NEC MultiSync 600 CD-ROM Drive w/ SCSI \$339.00
30485	NEC MultiSync 600 CD-ROM Reader \$239.00
Philips	
87485	Philips 6x Internal CD-ROM Drive \$219.00
85339	Philips CD External CD Drive \$335.00
33604	Philips CD2000/12 Internal CD Recorder \$949.00
Sony	
21929	Sony 4X Speed IDE CD-ROM Drive CSD-760E \$99.00
23157	Sony 4X Speed SCSI CD-ROM Drive CSD-765B \$99.00
23156	Sony 4X Speed SCSI w/SCSI Kit CSD-760S \$149.00
SCANNERS	
Artec Ultima	
31837	ViewStation A73 \$349.00
21707	Artec View Scan Color Scanner A2000C \$129.00
34165	Artec View Scan Color Scanner A2000D \$119.00
21708	Artec View Scan 256 \$179.00
31805	Artec ViewStation A6000C Plus \$289.00
Hewlett-Packard	
26202	HP Scanner 4C PC \$949.00
85463	HP Scanner 4p \$299.00
28151	HP Scanner 4S \$299.00
Logitech	
25432	Logitech Pagescan Color Scanner \$349.00
Microtek	
26598	ScanMaster ES PC \$579.00
30321	ScanMaster ES Pro \$599.00
31807	ScanMaster ES Pro PnP \$749.00
25588	Microtek Page Vitz \$121.00
26734	ScanMaster III PC \$1,887.00
UMAX	
21419	UMAX PageOffice Mac/PC \$299.00
83505	Vista-512 w/Photoshop LE \$779.00
83510	Powerlook II w/Photoshop \$2,239.00
83502	UMAX Vista 512 w/PhotoDisk \$399.00
Visioneer	
34166	Visioneer PaperPort 4X For Windows \$319.00
87562	Visioneer PaperPort Vx For Windows \$272.00
IMEDIA	
Imagemaster	
32070	Delto 1700MB Tr-Pack \$99.00
22335	Delto 250 Tr-Pack \$39.00
32067	Delto 420MB Tr-Pack \$59.00
32069	Delto 850MB Tr-Pack \$89.00

22338	Zip Media PC100 10 Pack \$149.99
22337	Zip Media PC100 3 PACK \$49.99
22336	Zip Media PC100 Single \$19.99
Sony	
06404	Sony 3.5" 128MB Rewrite M-D 512b/s \$117.00
01140	Sony 3.5" 320MB M-D 512b/s \$22.00
86782	Sony 3.5" MO 128MB3 Pack \$82.00
86780	Sony 3.5" MO 230MB3 Pack \$77.00
14367	Sony CD-R 4X 553MB (63 Min) \$7.00
90458	Sony CD-R 4X 650 MB (74 Min) 10 Pack \$75.00
14368	Sony CD-R 650MB (74 Min) \$7.00
14359	Sony D6120M 4mm Data Cart 4GB D0S-2 \$24.00
14358	Sony D690M 4mm Data Cart 2GB \$8.00
14394	Sony D02120 1/4" Data Cart 120MB \$13.00
14356	Sony D02120 1/4" Data Cart 120MB \$12.00
14355	Sony D02520 1/4" Data Cart 250MB \$18.00
14397	Sony D06525 1/4" Data Cart 525MB \$24.00
27805	Sony D1C-Wide 1 GB \$29.00
21407	Sony D1C-Wide 4 GB \$29.00
21406	Sony D1C-Wide 420MB 2 Pk. \$36.00
19317	Sony D1C-Wide 850MB \$29.00
27636	Sony Travan TPI-CT 400/800MB \$29.00
27649	Sony Zip 100MB PC Desk \$19.00
SyQuest	
00183	SyQuest Cartridge 88MB \$43.00
00278	SyQuest 200MB 5.25" Removable Cartridge \$53.00
02183	SyQuest 44MB Cartridge Unformatted \$41.00
97982	SyQuest 270MB 3.5" Removable Cartridge \$51.00
99822	SyQuest 105MB Cartridge \$39.00
24598	SyQuest EZ135MB Cartridge (PC or Mac) \$23.00
Verbatim	
17895	Verbatim 4mm DL 90m 2 DGB Tape \$7.00
90965	Verbatim 8mm DL 112m Data Tape \$7.00
33616	Verbatim 8mm DL 160m Data Cartridge \$14.00
17876	Verbatim DC2120 Data Cart QIC-80 Format \$15.00
27134	Verbatim DC2120 Extra QIC-80 Format \$24.00
21924	Verbatim DC2120 QIC-80 5PK Formatted \$58.00
21439	Verbatim DC2120 QIC-80 Format 2PK \$26.00
23151	Verbatim DC2120A Data Cart QIC-80 \$15.00
33614	Verbatim QIC 3020 TR-3 Extra \$32.00
33613	Verbatim QIC-80 TR-1 Extra \$32.00

SURGE / POWER PROTECTION

American Power	
94359	APC Back-UPS 200 \$89.00
96364	APC Back-UPS 400 \$149.00
11651	APC Back-UPS 600 \$236.00
28812	APC Back-UPS 650 PnP \$277.00
27098	APC Back-UPS Pro 280 PnP \$143.00
27097	APC Back-UPS Pro 420 PnP \$246.00
94396	APC Personal Surge Arrest 7 Outlet \$16.00
94395	APC Personal Surge Arrest 7 Outlet w/Phone \$18.00
94394	APC Professional Surge Arrest 7 Outlet \$23.00
94393	APC Professional Surge Arrest 7 Outlet w/Phone \$33.00
Optquest	
25687	OPT-SAFE - UPS Communications Software \$69.00
25688	OPTI-UPS 280C Uninterruptible Power Sys \$89.00
25689	OPTI-UPS 400C Uninterruptible Power Sys \$134.00
25690	OPTI-UPS 650C Uninterruptible Power Sys \$229.00
SOFTWARE	
Lotus	
12395	Lotus 123 RS for Windows \$291.00
12397	Lotus 123 RS for Win Comp/Net Upgrade \$92.00
24850	Lotus WordPro 96 \$94.00
28805	Lotus SmartSuite 4.0 for Windows 95 \$99.00
12408	Lotus SmartSuite 4.0 Full Version 3.5 \$349.00
12406	Lotus SmartSuite 4.0 Upgrade for Win - 3.5 \$139.00
21268	Lotus SmartSuite 4.0 for Win Upgr CD-ROM \$139.00
21269	Lotus SmartSuite 4.0 Full Version CD-ROM \$399.00
26270	Lotus SmartSuite 96 Upgrade CD \$139.00
26471	Lotus SmartSuite 96 Upgrade 3.5 \$139.00
26472	Lotus SmartSuite 96 Full Version 3.5 \$399.00
26473	Lotus SmartSuite 96 Full Version CD \$399.00

Symantec	
31743	Norton NT Tools 1.0 \$44.00
14064	Norton AntiVirus 3.0 10 Pk DOS/Win \$394.00
07153	Norton AntiVirus 3.0 DOS/Win \$49.00
07803	Norton AntiVirus 3.0 Upgr DOS/Win \$29.00
23947	Norton AntiVirus 2.0 for Win95 \$69.00
12545	Norton DiskLock 3.5 DOS/Win \$89.00
23919	Norton Navigator Win95 TradeUp \$39.00
23920	Norton Navigator for Win95 \$89.00
01387	Norton Utilities 8.0 \$112.00
07800	Norton Utilities 8.0 Upgrade \$49.00
23946	Norton Utilities for Win95 CD \$114.00
24657	Norton Utilities for Win95 TradeUp \$66.00
23946	Norton Utilities for Win95 \$114.00
27322	CommSuite 7.0 For Win 95 \$109.00
27310	CommSuite 7.0 For Win 95 CD \$99.00
27318	Cyberpack 7.0 For Win 95 CD \$49.00
27306	Cyberpack 7.0 For Win 95 3.5 \$49.00
12551	pcANYWHERE 1.0 For DOS/Win \$119.00
07653	pcANYWHERE 5.0 for DOS/Win Remote \$119.00
27304	pcANYWHERE 32 7.5 For Win95 & WinNT \$144.00
31729	pcANYWHERE 32 7.5 Win 95/NT Upgrade \$89.00
27317	WinFax Pro 7.0 Win 95 \$79.00
Adobe	
36527	Adobe FrameMaker 5.1 CD & 3.5 \$990.00
36528	Adobe FrameMaker 5.1 Upgrade CD & 3.5 \$189.00
88821	Adobe Illustrator 4.1 Upgrade For Windows \$49.00
10791	Adobe Illustrator 4.1 w/ Streamline 3.0 \$329.00
37610	Adobe PageMaker 6.5 Upgrade \$131.00
37611	Adobe PageMaker 6.5 Comp Upgrade Win \$189.00
37609	Adobe PageMaker 6.5/7.0 Windows \$549.00
11903	Adobe Photoshop 3.0 5 Windows \$549.00
17445	Adobe Photoshop 3.0 5 Upgrade \$174.00
32955	Adobe Photoshop 3.0 5 Gallery Effects 123 \$359.00
13033	Adobe Photoshop 3.0 5/4 1 Gallery Effects \$589.00
13013	Adobe Premiere 4.2 for Windows \$499.00
07319	Adobe Type Manager Deluxe 4.0 Windows \$49.00
Corel	
25498	CorelDRAW 6 Upgrade CD 10DRAW 3/4 \$359.00
19958	Corel GALLERY 2 \$49.00
31717	Corel Graphic 5 Pack \$99.00
32906	Corel Presentations 6.1 for Win 3.1x \$64.00
32933	Corel Visual CADD Upgrade Win 95/NT \$145.00
11010	CorelDRAW 4 for Win CD \$64.00
16037	CorelDRAW 5 CD-ROM \$429.00
22931	CorelDraw 6 CD-ROM \$199.00
27932	CorelDraw 6 CD Upgrade for DRAW 5 \$199.00
32988	Corel Office Professional 7 Win 95 \$449.00
32950	Corel Office Professional 6.1 for Win 3.1x \$449.00
32951	Corel Office Professional 6.1 Trade Up Upgrade \$219.00
32991	Corel Presentations 7 WIN 95 CD \$64.00
32906	Corel Presentations 7 WIN 3.1x \$64.00
Microsoft	
07404	MS WORD 6.0 for Win Ver/Comp Upgrade \$119.00
07947	MS Project 4.0 Ver Upgr for Windows \$134.00
12410	MS Access 2.0 Ver/Comp Upgr for Win \$114.00
14006	MS Excel 5.0 for Win Comp/Version Upgr \$189.00
24096	MS PowerPoint for Win 95 Upgr - 3.5 \$99.00
24102	MS Project for Windows 95 Upgr - 3.5 \$129.00
24117	MS Word for Windows 95 Upgrade - 3.5 \$54.00
12153	MS Office 4.2 for Win Ver/Comp Upgr \$259.00
16358	MS Office 4.2 for Win Upgr on CD-ROM \$259.00
17831	MS Office 4.3 Pro Ver / Comp Upgr \$349.00
20163	MS Office Pro v4.3 and Bookshelf Upgr \$349.00
24077	MS Office Standard for Win 95 Upgr - 3.5 \$179.00
24079	MS Office Standard for Win 95 Upgr CD-ROM \$179.00
24085	MS Office Pro for Windows 95 Upgr - 3.5 \$269.00
24087	MS Office Pro w/ Blast Win 95 Upgr CD \$269.00
12226	MS DOS 6.22 Upgrade \$47.00
07132	MS Plus for Windows 95 CD-ROM \$39.00
24051	MS Windows 3.11 \$99.00
24050	MS Windows 95 - 3.5 \$179.00
24052	MS Windows 95 Upgrade CD-ROM \$99.00

* After \$40.00 mail in rebate (expires 12/31/96)

US Robotics
The Intelligent Choice in Information Access

Sportster WinModem
28.8 Internal

- True V.34 data transmissions at 28.8 Kbps
- Plug and Play

ONLY \$99.98
Order #32088

Microsoft

ONLY \$129.98
Order #35480

Microsoft Windows NT Workstation 4.0 Upgrade

- Same easy-to-use interface as Windows 95
- The highest level of OS performance and reliability available!

PNY
The Memory Leader Worldwide

8MB EDO Memory

ONLY \$49.98
Order #28337

- 100% guaranteed compatibility
- Lifetime warranty
- Toll-free tech support

Price shopping? Call us BEFORE you buy!

Call Today for Your FREE CATALOG!



PLEASE USE THIS CODE TO RECEIVE THESE SPECIAL PRICES
PMB610

1-800-258-8088

Corporate, Education and Government bids welcome! Fax to 1-800-417-1993
CIRCLE 199 ON READER SERVICE CARD

Ask Our Advisors

HARDWARE

Snap, Crackle, Phht!



When I moved to a new apartment last October, my computer worked fine.

Then in May I began having problems with the display—my monitor would snap off, then turn back on by itself. This occurred more and more frequently, and eventually the image began to look wavy as well. When I took the monitor to a repair shop, of course the problem would not appear, but at home it got to the point that I'd have to cycle the power switch to get the image back.

A second repair shop found melted components on the monitor's circuit board. Repair was expensive, so I bought a new monitor. Soon, it too was snapping off and on. I took the entire system to my father's house, where it ran without incident. Back home, though, it exhibited the same bizarre behavior no matter where I plugged it in.

I've begun to suspect electromagnetic interference as the source of my difficulties, because there's a large array of wires on two poles adjacent to my building. This is consistent with the

problem starting in May, because that's when the air conditioning season starts here in Arizona and power consumption increases. Do you think this is the problem? And do you have any suggestions for solving it?

DAVE MCWHORTER
Gilbert, Arizona

PC MAGAZINE: You probably don't have to look as far as the power lines outside your window for the cause. I think you'll find the problem right at your power outlet. Fortunately, a good-quality standby power supply should solve all your problems.

The key clue was your excellent observation that correlated the advent of the monitor problem with the start of air conditioning season in your area. While this may possibly increase the electromagnetic fields from the power lines, it will almost certainly cause a voltage drop in your power line, especially if your apartment (or block) has insufficient electrical service to handle the load. Every time one of your neighbor's compressors fires up, this pulls down the voltage. Your monitor has regulating circuitry to try to adjust to changing voltages, but if the level gets too low,

the monitor will just give up and save itself by shutting down. Then the voltage comes back up to normal levels, and the monitor does its best to restart.

One way to test this theory is to plug an incandescent light into the same outlet as your computer and watch for a dimming of the bulb at the same time that your monitor goes on the blink. A more sophisticated approach is to rent a device that will log the voltage in your outlet over a period of time; check with local electrical supply houses for leads on a source.

If this theory proves true, get a good-quality standby power supply that protects against voltage drop as well as power outages. When the voltage at the outlet drops below a certain level, the standby supply will kick in and provide sufficient power for your monitor. It will then drop off-line again when the power gets back up to proper levels. This should help keep your monitors from blinking themselves into oblivion.—*Alfred Poor*

Four Great Colors

I have a 386 computer and an older IBM CGA color monitor. I want to run Windows 3.1 on my machine, but I'd like to continue using the monitor because the colors are so great. Will I

SOFTWARE • PERIPHERALS • SYSTEMS • COMPONENTS • TOLL-FREE • ADVICE



**Premier Superstores
Top Direct Marketers**

**Manufacturers of
Systems, Software,
and Peripherals
.....**

**If it's sold direct,
you'll find it here.**

INDEX

SYSTEMS

CompuLink Research	273
COMPUTER DISCOUNT	
WAREHOUSE	254
FOSA	289
HARTFORD COMPUTER	
GROUP	290
INSIGHT DIRECT, INC.	266
MIDWEST COMPUTER	
WORKS	294
NECX	265
PCs Compleat	277
USA Flex	274

SOFTWARE/PERIPHERALS/ COMPONENTS

ARLINGTON COMPUTER	
PRODUCTS	268

BULLDOG	284
COMPUTER/DISCOUNT	
WAREHOUSE	254
First Source International	271
H. Co./Micro Mall	286
INSIGHT DIRECT, INC.	266
LA Trade	288
Magix	260
MEGAHAUS	270
Micro Solutions	285, 293
MIDWEST COMPUTER	
WORKS	294
MIDWEST MEMORY	
WORKS	263
PC Connection	292
PC Zone	262
SPSS, Inc.	287

NECX Direct

Mail Order Company of Choice
for Business, Education
and Government Buyers!

SHARP
PC 9030 5/120
8/1.1GB 6XCD

\$3499

PC3040 5/100 8/1.1GB 12.1" Active\$2199
PC9080 5/100 8/1.1GB 6X CDCALL
PC9070 5/133 16/1.1GB 4X CD2499

ViewSonic
17PS 17" (15.7 v) .25mm
Many innovative features.
Viewsonic makes it easy to
choose the best!

\$710

17GS 17" (16.9v) .27dp\$415
PT770 17" (16.0v) .25dp779
20G 20" (18.4v) .28mm1100

PNY
"The Memory
Leader..Worldwide"
Call us for all your memory
upgrade needs.

CALL

519M4 Memory 72 Pin
321004ESS1T08 4MB EDO 1X32 60NS\$54
322004ESS1T16 8MB EDO 2X32 60NS108
324004ESS2T08 16MB EDO 4X32 60NS285

HP
M100T 5/100
8/720MB 4XCD

\$2799

C100T 5/100 8/720MB Active\$2799
C120T 5/120 8/1000MB Active3199
M120T 5/120 8/1000MB 4XCD4499
M133T 5/133 16/1000MB 4XCD4999

NOTEBOOKS

AST - Accentia Series

J20 P/100 8/540 11.3" Dual\$1699
P40 P/120 16/2.1GB 4XCD ActiveCall
P50 5/133 8/1.2GB 4XCD ActiveCall

CTX - EZbook Series

Ez 500T 5x/100 8/810MB Active\$1599
EzTX-16 5/100 8/1.0GB 4XCD Active2100
Ez 700 SeriesCall

FUJITSU PC

Milan and Monte Carlo Series available\$Call

MAGTRONIC

5/133 8/2.1GB 4XCD Active\$2999
5/133 16/2.1GB 6XCD 12.1" Active3700
620 Series up to 5/150 and 12.1" SVGACall

SAMSUNG - Sans 800 & 810 Series

800 5/90 8/1.3GB Active\$1850
810 5/120 16/1.3GB 6XCD Active4000

TEXAS INSTRUMENTS

TM8020 5/120 8/1.0GB Active\$4100
TM8030 5/133 16/1.35GB Active4850

NEC - Versa Series

2405 5/100 8/810 Dual\$2100
4050H 5/90 8/810 Active2880
6000H 5/100 16/1.0GB 6XCD3900
6030H 5/133 16/1.3GB 6XCD4850

PRINTERS

CANON

BJC-4100 720x360dpi Color Inkjet\$240
BJC-70 720x360dpi Color Portable Inkjet296
BJC-610 720dpi Color Inkjet420

CITIZEN

PN60 360dpi Thermal\$300
Printiva 600C 600dpi Thermal490

EPSON - Stylus Series

Color IIS 360dpi Color Inkjet\$190
Color II PC/Mac 720dpi Color Inkjet279
Color PRO PC/Mac 720dpi Color Inkjet448
Color PRO XL PC/Mac 720dpi Color1780

HEWLETT PACKARD

DeskJet 340 600x300dpi Portable Inkjet\$290
DeskJet 400 600x300dpi 3ppm Color200
DeskJet 870CXL 600dpi 8ppm Color Inkjet480

LEXMARK

OPTRA E 600dpi 6ppm\$545
OPTRA R+ 1200dpi 16ppm1280

OKIDATA

OKIPAGE 4W 4ppm 600dpi\$300
OL610E LED 600dpi 6PPM490
OL810E LED 600dpi 8PPM755
OL1200 LED 600dpi 12PPM975

NETWORKING

INTERFACE CARDS

3COM

EtherLink XL PCI 10/100 Base-TX\$131
EtherLink XL PCI Combo127

ALLIED-TELESYN

CentreCom AT-2000 Plus\$30
CentreCom AT-2000U Plus38

ASANTE

FriendlyNet PC Card\$155

BOCA RESEARCH

BocaLan Card 10T\$42
BocaLan Card Combo46

INTEL

EtherExpress Pro+ PCI 10T\$110

HUBS

3COM

SuperStack II Hub10 12 Port 10T\$570

BAY NETWORKS

2814-05 16 Port 10T LatticeHub\$1300

D-LINK

DE-816TP 16 Port 10T Hub\$310

LINKSYS

Compact 5 Port 10T Hub\$66

STORAGE

CONNER

Disklor 1300MB EIDE\$272
Python 2GB Int. DAT Tape Drive805

HEWLETT PACKARD

Colorado 74000S 8GB Int. SCSI Tape\$380
Surestore 4020I CD-Recorder855

IOmega

Zip Drive 100MB Parallel\$195
Jaz Drive 1GB SCSI Int.389
Ditto 3200MB Int. Tape Drive223

MICRO SOLUTIONS

Backpack Ext. 850MB\$310
Backpack Ext. 1600MB450

QUANTUM

Fireball 1080MB EIDE\$177
Fireball 3200MB EIDE380

SEAGATE

Medialist 1080MB EIDE\$188
Medialist 2140MB EIDE278

WESTERN DIGITAL

Caviar AC2850 850MB EIDE\$169
Caviar AC33100 3100MB EIDE420

MONITORS

ACER

AcerView 55 15" 28dp\$335
AcerView 56E 15" 28dp350
AcerView 76E 17" 27dp600
AcerView 98 21" 28dp1738

MAG INNOVATION

DX15T 15" 28dp Trinitron\$380
DX1795 17" 28dp Trinitron610
DX17T 17" 28dp Trinitron680

MITSUBISHI

Diamond Pro 21TX 21" 28dp\$1560

OPTIQUEST

V775 17" 28dp\$615
1789 DC 17" 28dp560

PRINCETON GRAPHICS

EO14 14" 28dp\$236
Ultra 17+ 17" 28dp805

SAMSUNG

SynchMaster 17 GLI 17" 28dp\$670
SynchMaster 17GLSI 17" 28dp824

SONY

MultiScan 15SX 15" 25dp Trinitron\$385
MultiScan 17SFL 17" 25dp Trinitron785

SCANNERS

AGFA

STUDIOScan 400x800dpi Color Flatbed\$890

ARCUS II

600x1200dpi Color Flatbed1830

EPSON

ES-300GS 300dpi Desktop\$355
ActionScanning System II 300x600dpi Flat425
ES-1000C 400x800dpi Color Flatbed570
ES-1200C 600x1200dpi Color Flatbed945

HEWLETT PACKARD

ScanJet 4S 200dpi Personal Desktop\$169
ScanJet 4P 300dpi Color/Grayscale Flat490
ScanJet 4C 600dpi Color Flatbed945

MICROTEK

PageWiz Desktop\$120
ScanMaker E3 300x600dpi Color Flatbed370
ScanMaker E6 600x1200dpi Color Flatbed570

UMAX

PageOffice 300dpi Desktop\$188
Vista-S8LE 400x800dpi Flatbed595
Vista-S12LE 600x1200dpi Flatbed740

VISIONEER

Paperport IX 400dpi Desktop\$315
Paperport 400dpi Grayscale Desktop173
Paperport VX 400dpi Grayscale Desktop275

MODEMS

CARDINAL

MVPV34XF 33.6 Data/Fax External\$138
MVPV34I 33.6 Data/Fax Internal118

DIAMOND MULTIMEDIA

Supra 33.6 Data/Fax Internal\$165

MOTOROLA

Premier 33.6 External\$256
Premier 33.6 Internal240

U.S. ROBOTICS

Courier V.Everything 33.6 Ext.\$278
Courier V.Everything 33.6 Int.243

MULTIMEDIA

ACER

8X Int CD-ROM\$119

CREATIVE LABS

Sound Blaster AWE32 PnP\$139

NEC

Multipin 6XI Ext.\$345
Multipin 6XI Int.345

PANASONIC

KXL-D740 Portable CD\$380

PLEXOR

6Plex Int. w/o card\$254
8Plex Int. SCSI w/o card370

SOFTWARE

O/S AND NETWORKS

M/S Windows NT Server V4.0 10 Clients\$1089
M/S Win NT 4.0 Workstation Lic. upgrade115
M/S Backoffice V2.0 upgrade CD685
IBM OS/2 Warp Server 4.0515
Novell Netware 4.1, 5 client780

INTERNET

Connectix Videophone w/Quick Cam\$139
Macromedia Backstage Desktop Studio460
M/S FrontPage Win95/NT136
Netscape Navigator V2.0 Gold Win9575
Qualcomm Eudora Pro V2.2.5 user Win213
Ventana "Hot Metal Pro" V2.0 Mac180
Ventana Internet Phone 2-pk Win79

MULTIMEDIA/DRAW/PAINT

CorelDraw V5 - V6 upgrade Win\$189
MM Freehand V5.0 Win CD99
Macromedia Dir. V5/MM Studio Upg.470

PROGRAMMING/DEVELOPMENT

Borland Delphi 2 Client/Server Suite\$1850
MS Visual Basic Pro V4.0 Win95 upg. CD81
MS Visual C++ Subscription V4.0 Win Up.315
MKS MKS Tool Kit V5.1 Unix244
PowerBuilder Enterprise upgrade wh/wh1398

CAD/CAM

AutoDesk AutoCad LT V2.0 Win CD\$283
Vigrafix Designcad Office Win 95580

HEWLETT PACKARD
LaserJet 5P

**PRINT IT
ON AN HP!**

\$870

SL-PS 600dpi 4ppm 1MB\$470
5 600dpi 4ppm 4MB1280
5N 600dpi 12ppm 4MB1530
5M 600dpi 12ppm 4MB1780

Cardinal
MVPV34I 33.6 Kbps
**ONE STEP
CLOSER TO REAL
TIME!**

\$118

MVPV34XF 33.6 Data/Fax External\$138
MVPV34XV 33.6 Data/Fax/Voice External151
MVPV34IV 33.6 Data/Fax/Voice Internal132

Microsoft
Visual Basic
Pro 4.0
Windows 95
Upgrade CD

\$81

Windows NT Server V4.0 5 Client Upg.\$399
Windows NT Server V4.0 10 Client Upg.599
Visual C++ V4.0 Windows84

MicroSolutions
BackPack BX
CD-ROM Drive
Blazing speed and easy
portability!

\$325

BackPack 4X without sound\$388
BackPack 4X with sound399
BackPack 8X with sound415



NECX Direct - Award Winning
Mail Order Reseller

For volume quotes and orders call: 800-961-9223
www.necx.com



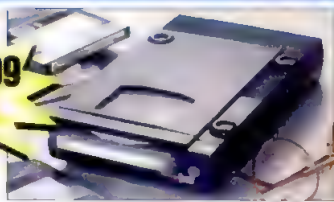
PURCHASE ORDERS, CHECKS AND MONEY ORDERS WELCOME. Prices and availability subject to change without notice. All returns require a Return Merchandise Authorization number. All products are covered by the original manufacturer's warranty. Not responsible for typographical errors. NECX and NECX Direct are registered service marks of New England Circuit Sales, Inc. © 1996. All other marks remain the property of their respective companies.

CIRCLE 327 ON READER SERVICE CARD

PM184



\$499.99
IOJAZEXT



Jaz™ Drive

Pack up to 1GB of data on a single disk—with no limit to the number of disks you can use. This Jaz drive is perfect for backing up your entire system fast—1GB of data in about 5 minutes. Easily handles your most

demanding applications—even full screen, full motion video! Ideal as a second hard drive—works faster than most PC internal drives. A single disk holds 8 hours of CD-quality audio, a 2-hour movie or 1GB of any data.

PRINCETON GRAPHIC SYSTEMS

\$569.99
CMPGE017



EO17 17" Monitor

Ultra High Resolution Multi-frequency Color Monitor with microprocessor-based digital controls, and On-screen display.

- 17"/15.8" screen/viewable size
- 1280 x 1024 resolution
- .28mm dot pitch

Memory Modules



4MB 72-pin	\$35.99	4MB 72-pin EDO	\$39.99
ME1X32-70		ME1X32-EDO	
8MB 72-pin	\$59.99	8MB 72-pin EDO	\$69.99
ME2X32-70		ME2X32-EDO	
16MB 72-pin	\$109.99	16MB 72-pin EDO	\$119.99
ME4X32-60		ME4X32-EDO	
32MB 72-pin	\$229.99	32MB 72-pin EDO	\$239.99
ME8X32-60		ME8X32-EDO	

*All memory subject to change without notice—Please call for latest pricing.

Seagate

1275MB IDE Hard Drive

- 1275MB capacity
- 12.5ms access
- 64K cache
- 4,500 RPM
- 16.6Mbytes Transfer rate
- 3.5" 1"H Form Factor/Height
- Fast-ATA-2 Interface
- 3 year manufacturer's warranty



\$189.99
ST31276A

Notebooks

Toshiba Satellite 110CS P100 11.3" DSTN 840MB RAM	\$1,979.99
Toshiba Satellite Pro 420CS P100 11.3" DSTN 840MB RAM	\$2,449.99
Toshiba Portege 650CT P133 11.3" TFT 1672MB RAM	\$4,399.99
Toshiba Tecra 700CS P120 11.3" DSTN 840MB RAM	\$3,899.99
Toshiba Tecra 720CDT P133 12.1" TFT 16144MB RAM	\$5,299.99
TI Extensa 510 P100 11.3" DSTN 840MB RAM	\$1,769.99
TI Extensa 570CD P100 11.3" DSTN 840MB RAM	\$2,259.99
TI Extensa 570CDT P100 10.4" TFT 840MB RAM	\$2,945.99
TI Extensa 570CDTSE P100 10.4" SVGA 872MB RAM	\$3,435.99
TI TravelMate 6020 P120 11.3" SVGA 872MB RAM	\$4,125.99
TI TravelMate 6050 P120 12.1" SVGA 1672MB RAM	\$4,899.99
AST Ascentia J10 P75 10.4" DSTN 840MB RAM	\$2,035.99
AST Ascentia J30 P100 10.4" DSTN 840MB RAM	\$2,085.99
AST Ascentia J30 P100 10.4" TFT 840MB RAM	\$2,465.99
AST Ascentia P30 P133 10.4" TFT 840MB RAM	\$2,845.99
AST Ascentia P30 P100 11.3" DSTN 840MB RAM	\$2,429.99
AST Ascentia P30 P100 11.3" DSTN 840MB RAM	\$2,619.99
AST Ascentia P50 P133 11.3" TFT 840MB RAM	\$3,565.99
AST Ascentia P50 P133 11.3" TFT 840MB RAM	\$3,755.99

Notebooks

IBM ThinkPad 365E 5186C 10.4" DSTN 824MB RAM	\$1,799.99
IBM ThinkPad 365XD P100 10.4" DSTN 840MB RAM	\$2,299.99
IBM ThinkPad 365XD P120 10.4" TFT 840MB RAM	\$2,949.99
IBM ThinkPad 760EL P100 11.3" DSTN 872MB RAM	\$3,199.99
IBM ThinkPad 760ELD P100 12.1" TFT 872MB RAM	\$4,499.99
IBM ThinkPad 760EL P120 11.3" DSTN 872MB RAM	\$4,999.99
IBM ThinkPad 760E P120 12.1" TFT 840MB RAM	\$4,549.99
IBM ThinkPad 760E P133 12.1" TFT 1680MB RAM	\$5,999.99
IBM ThinkPad 760ED P133 12.1" TFT 1680MB RAM	\$6,999.99
IBM ThinkPad 560 P100 11.3" DSTN 840MB RAM	\$2,699.99
IBM ThinkPad 560 P120 12.1" TFT 840MB RAM	\$3,749.99
IBM ThinkPad 560 P133 12.1" TFT 840MB RAM	\$4,199.99
Compaq Armada 1120 P100 10.4" DSTN 824MB RAM	\$1,899.99
Compaq Armada 1120T P100 10.4" TFT 824MB RAM	\$2,225.99
Compaq Armada 4110 P100 11.3" DSTN 840MB RAM	\$2,499.99
Compaq Armada 4110 P100 11.3" DSTN 840MB RAM	\$2,899.99
Compaq Armada 4120 P100 11.3" DSTN 1648MB RAM	\$3,095.99
Compaq Armada 4120T P120 11.8" TFT 1648MB RAM	\$3,775.99
Compaq Armada 4130T P133 11.8" TFT 1648MB RAM	\$4,449.99

IDE Hard Drives

Western Digital	
850MB Caviar 10ms 64K 4,500 WD280A	\$159.99
1280MB Caviar 10ms 128K 5,200 WD2120BA	199.99
1620MB Caviar 10ms 128K 5,200 WD3180BA	219.99
2113MB Caviar 12ms 128K 5,200 WD3210BA	269.99
2559MB Caviar 12ms 128K 5,200 WD3250BA	299.99
3166MB Caviar 12ms 128K 5,200 WD3310BA	379.99
Seagate	
631MB Medialist XE 14ms 120K 3.811 ST3630A	\$145.99
850MB Medialist 14ms 120K 3.811 ST3800A	155.99
1082MB ST31081A 14ms 64K 3,600 ST31081A	169.99
1275MB ST31276A 14ms 64K 4,500 ST31276A	189.99
1623MB ST31621A 14ms 128K 5,400 ST31621A	215.99
182MB Medialist 10.5ms 128K 5,400 ST31270A	199.99
2113MB Medialist 10.5ms 128K 5,400 ST32140A	259.99
Toshiba—2.5" Notebook Drives	
810MB Slimline 13ms 128K 4,200 MK1308FCV	\$299.99
1300MB Slimline 13ms 128K 4,200 MK1308MAV	449.99
1300MB Notebook 13ms 128K 4,200 MK2208FC	459.99
2100MB Notebook 13ms 128K 4,200 MK2108MAV	599.99
Quantum	
850MB Trailblazer 14ms 128K 4,500 QUTR850A	\$169.99
1700MB Sirocco 11ms 128K 4,500 QUS1700A	225.99
2550MB Sirocco 11ms 128K 4,500 QUS2550A	319.99
2168MB Fireball 10.5ms 128K 4,500 QUTM2168A	279.99
3254MB Fireball 10.5ms 128K 4,500 QUTM3254A	359.99

SCSI Hard Drives

30-Pin Drives (Seagate, Western Digital, Micropolis, Quantum)	
1080MB Medialist 12.5ms 128K 5,400 ST31080A	\$249.99
1050MB Hawk 2XL 9ms 512K 5,411 ST31055A	349.99
2149MB Hawk 2XL 9ms 512K 5,400 ST32155A	549.99
4294MB Barracuda 8ms 512K 7,200 ST32500A	749.99
4294MB Barracuda 8ms 1024K 7,200 ST32510A	1,049.99
9090MB Elite 9 11ms 1024K 5,400 ST41090A	2,099.99
2170MB Enterprise 8ms 512K 7,200 WD0170B	CALL
4360MB Enterprise 8ms 512K 7,200 WD0436B	CALL
2100MB Ames 8.5ms 512K 5,400 MK2415	429.99
4300MB Taurus 8.5ms 512K 7,200 MK2435	549.99
4300MB Capricorn 8.5ms 512K 7,200 MK2435	859.99

9100MB Scorpion 12ms 512K 5,400 MK2910B	1,649.99
9100MB Tomahawk 8ms 512K 7,200 MK3510B	1,999.99
1280MB Tempest 10.5ms 128K 4,500 QUTM1280B	319.99
2100MB Tempest 10.5ms 128K 4,500 QUTM2100B	359.99
3200MB Tempest 10.5ms 128K 4,500 QUTM3200B	499.99
68-Pin Drives (Seagate, Western Digital, Micropolis, Quantum)	
1050MB Hawk 2XL 9ms 512K 5,411 ST31055A	\$389.99
2149MB Hawk 2XL 9ms 512K 5,400 ST32155A	579.99
4294MB Hawk 4 9ms 512K 5,411 ST32500A	989.99
2147MB Barracuda 8ms 512K 7,200 ST32500A	799.99
4294MB Barracuda 8ms 1024K 7,200 ST32510A	1,104.99
9090MB Elite 9 11ms 1024K 5,400 ST41090A	2,154.99
2170MB Enterprise 8ms 512K 7,200 WD0170B	CALL
4360MB Enterprise 8ms 512K 7,200 WD0436B	CALL
2100MB Taurus 8.5ms 512K 7,200 MK2415	739.99
4300MB Capricorn 8.5ms 512K 7,200 MK2435	1,029.99
9100MB Scorpion 12ms 512K 5,400 MK2910B	1,899.99
9100MB Tomahawk 8ms 512K 7,200 MK3510B	2,039.99
2150MB Atlas 8ms 1024K 7,200 QUTP2150B	679.99
4300MB Atlas 8ms 1024K 7,200 QUTP4300B	949.99

80-Pin Drives (Seagate, Western Digital, Micropolis)	
4294MB Barracuda 8ms 1024K 7,200 ST32510A	1,104.99
4360MB Enterprise 8ms 512K 7,200 WD0436B	CALL
9100MB Tomahawk 8ms 512K 7,200 MK3510B	2,049.99

Modems

USR WinModem 33.6/14.4 Int. USB/RTS	\$109.99
USR Sportster Classic 33.6/14.4 Ext. USB/RTS	149.99
USR Sportster Classic 33.6/14.4 Ext. USB/RTS	169.99
USR Voice 33.6/14.4 Int. USB/RTS	169.99
USR Voice 33.6/14.4 Ext. USB/RTS	189.99
USR V1 33.6/14.4 DSVD Int. USB/RTS	169.99
Motorola BitSurfer Pro ISDN Ext. MEMOTSPRO	349.99
Motorola BitSurfer TA210 ISDN Ext. MEMOTSDN	269.99
Motorola BitSurfer ISDN ISA Int. MEMOTSDN	269.99

Computer Systems

Inteva Am5x86-133MHz 8/850MB mvsx133B	\$799.99
Inteva Am5x86-133MHz 16/1.6GB mvsx133B	999.99
Inteva AMKS-PR100 8/850MB 8X CD mvsx100B	999.99
IBM Aptiva C33 842176C3	1,999.99
IBM Aptiva C66 842176C6	2,449.99
IBM Aptiva C77 842176C7	3,299.99

Call and ask us about our Business Leasing!

800-INSIGHT

Your Direct Source
<http://www.insight.com>

800-INSIGHT

Arlington Computer Products...computing solutions since 1984!

PC MAGAZINE "...Arlington offers worry-free mail order purchasing!"

PC WORLD "Consistently the lowest prices!"

PC COMPUTING "...Courteous service and terrific technical support!"

Pentium Powered CD-ROM

color notebooks: the new
Satellite Pro 420 series.

- Powerful Pentium® 100MHz chip
- 6X speed CD-ROM
- 8MB EDO RAM
- 11.3" dual-scan or active
- 810MB/CDS; 1.26GB on CDT

Satellite Pro 420CDS.....\$2419

Satellite Pro 420 CDT...Best price!

Satellite Pro 410CS.....\$2219

Satellite 110 Series with 100MHz Pentium® chip!!!

- 11.3" DS or active at 800 x 600
- local bus video & a graphics accelerator
- 810MB drive • 8MB RAM

Satellite 110 CS/CT...\$1929/\$2419

Portege 610CT.....\$2419

• 90MHz ultraportable

Portege 650CT.....CALL

• Pentium® 133MHz chip

• 1.2GB drive • 16MB RAM

The new Tecra 500 series with a 120MHz Pentium® chip.

- Select bay with swappable FDD, 6X CD-ROM, 2nd HDD
 - 12.1" DS or active
 - Integrated V.34 fax/modem
 - 1.3GB drive
 - Fast infrared port
- 500CS...\$3569
or CDT...CALL



Tecra 720CDT

The Tecra 730CDT combines a 150MHz Pentium® processor with PCI architecture & Zoomed Video.

- 12.1" active with 1024 x 768 res.
 - 6X CD-ROM • full motion video
 - built-in 28.8 fax modem
 - 2.1GB hard drive
 - PCI system and expansion bus
 - 16MB RAM expandable to 144MB
- Tecra 730CDT.....CALL
Tecra 720CDT.....CALL
- 133MHz Pentium® processor
 - 1.2GB removable drive
 - 32-bit PCI bus

EPSON®

FX670.....\$279	LQ870.....\$429
FX1170.....\$389	LQ1070+.....\$379
FX2170.....CALL	LQ1170.....\$679
LQ570+.....\$239	DFX5000+.....\$1369

DFX8000.....\$2289	Stylus Color 500 - Vivid 720dpi color on any type paper!!!.....\$279*
LQ2170.....CALL	Stylus Color XL.....\$379*
Stylus Color XL.....CALL	Photo PC - digital camera.....LOW!
Stylus 1500.....CALL	

Thousands of printers in stock! Most shipped same day!

*free shipping

TEXAS INSTRUMENTS

Extensa 570CD/CDT.....\$2209/\$2879
TMS300/6020/6030.....\$3279/\$4029/\$4789
Micro Laser Pro 8 or 12.....\$1099/\$1359

Canon

BJC-3070/210.....\$259/\$289/\$149
BJC-230/240/4100.....\$379/\$179/\$229
BJC-620/4200/4550.....\$399/\$299/CALL
NoteJet III 75/540.....\$2399
NoteJet III P75 or T-510.....\$3049/\$3649
NoteJet III CX P90 or 120.....\$4599/\$279

OKIDATA

800e.....\$399	ML321.....\$429
810e.....\$479	ML520.....\$379
610eps.....\$699	ML521.....\$499
OKI4W.....\$289	ML590.....\$429
OL810E.....\$699	ML591.....\$589
OL1200.....\$979	ML395.....\$979
ML320.....\$319	ML3410.....\$1249

HEWLETT PACKARD

LaserJet 5P / VMP.....\$859/\$1039
LaserJet VL.....\$479
OfficeJet 300/330.....\$529/\$569
2MB/4MB/8MB upgr.....\$49/\$59/\$89
DeskJet 600/680/1600.....\$199/\$299/\$1349
DeskJet 820CXI/870CXI.....\$379/\$489
4P/4C Scanner.....\$489/\$919

LEXMARK

Optra R+ or C.....\$1249/\$5899
Optra LX+ or LXN+.....\$1819/\$2229
Optra RT+ or RN+.....\$1499
Optra 422B/N.....\$1249/\$2679

NETWORKING

Net 3.12 5/10/25-user.....\$619/\$1299/\$1799
Net 3.12 50/100/250.....\$2299/\$3999/\$4999
Net 4.1 10/25-user.....\$1299/\$1799
Net 4.1 50/100-user.....\$2249/\$3399
Lantastic Starter 7.0.....\$249
3 Com Etherlink III.....\$109
3 Com III 5/20-pack.....\$349/\$1299
3 Com Combo 5/20-pack.....\$499/\$1829
3 Com 28.8/Ether.....\$389
Intel Ether 16 or Pro.....\$89
Intel Pro TP 5/20-pack.....\$319/\$1149

APC 280/400/450.....\$99/\$149/\$169
600/900/1200.....\$239/\$329/\$289
Pro 420/650 PNP.....\$229/\$269
Smart 450/700/1000.....\$289/\$339/\$449
Smart 1400/2200.....\$559/\$999

CHIPS

1MB/4MB Simms.....\$29/\$59
8/16/32MB Simms.....\$79/\$129/\$329

intel OVER DRIVE

DX4-75MHz/100MHz.....\$135/\$169
Pentium® chip 63/83MHz.....\$139/\$179
Pentium® chip 120/133MHz.....\$259
Pentium® chip 150/166.....\$319/\$439

MODEMS

Megahertz 28.8 V.34 PCMCIA.....\$239
Megahertz Ether/28.8.....\$279



Accura 28.8 Int/Ext.....\$149/\$159
Accura 28.8 Int Voice.....\$169
PCMCIA 28.8 Fax.....\$209
Optima 28.8 Voice Int/Ext.....\$209/\$219

US ROBOTICS

Sportster 28.8 Win Internal.....\$109
Sportster 28.8 Int/Ext.....\$139/\$159
Sport 28.8 Voice Int/Ext.....\$155/\$165
Courier 28.8 Int/Ext.....\$229/\$269

DRIVES & TAPES

Colorado T-1000/1000E.....\$159/\$185
MicroSolutions Back Eight CD.....\$319
NEC 8X/8Xe.....\$339/\$439
Seagate 1.2GB/1.6GB.....\$199/\$219
Seagate 2GB/9GB.....\$289/CALL
West Digit 1.2GB/1.6GB.....\$209/\$239
West Digit 2GB/2.5GB.....\$319/\$349

SCANNERS/DIGITIZERS

Epson Action Scanning II.....\$389
Epson Scan 1000/1200.....\$559/\$1059
Kodak DC-20/40/50.....\$329/\$589/\$969
Logitech PageScan.....\$299
Microtek E3 or E6.....\$369/\$549
Microtek ScanMaker III.....\$1859
Relisys Scorpio/Taurus.....\$339/\$499
Summasketch 12 x 12.....\$229
Summasketch 12 x 18.....\$459
UMAX S6E/S12.....\$399/\$689
UMAX Powerlook II.....\$1449
Visioneer Paper VX.....\$255

MONITORS

EIZO/NANAO
F2-15/F2-17/17EX.....\$559/\$839/\$939
T2-17 ESP/17TS.....\$1059/\$1039
T2-20 ESP/F2-21.....\$1819/\$1799
TXCTS/FX2-21.....\$1019/\$2869

SONY

15SFII.....\$475	17SFII.....\$779
15SX1.....\$399	20SFII.....\$1629
17SEIIT.....\$979	SEIIT.....\$1899

VIEWSONIC

15GS/15GA/17GA.....\$379/439/\$669
17PS/17EA/17GS.....\$709/609/\$609
PT770/PT810.....\$779/\$1599
P810/P815.....\$1659/\$1859

PRINCETON® GRAPHIC SYSTEMS



EO40 - 14" 1024 x 768.....\$229
EO50 - 15" 1280 x 1024.....\$319
EO17 - 17" has 70KHz horiz. with 1280 x 1024 ni and a .26mm dot pitch.....\$559
EO 70 - 17" 1280 x 1024, .28mm dot pitch.....\$519
EO75 - Super-high 95KHz horiz. capable of 1600 x 1200 with .26mm dot pitch.....\$659



MXP17F - 26 pitch, 1600x1280.....\$679
DX1495/1595.....\$249/\$339
DX1795.....\$579
MX21F - 1600 x 1280ni.....\$1429
Trinitron
DX15T / DX17T.....\$369/\$649

Ultra 40 - 14" monitor 1024 x 768, .28mm.....\$210
Ultra 50 - 15" monitor, 1024 x 768, .28mm, flat square.....\$279
Ultra 70F - 17" 65KHz horiz. allowing 1280 x 1024 ni, .28 mm dot pitch, flat square.....\$489
Ultra 17+.....\$569
This 82KHz monitor is so competitively priced that it actually sells for less than many competitor's 64KHz product! 17" flat square with .28mm dot pitch and a maximum resolution of 1600 x 1200 ni. On-screen display digital controls.
Ultra 20 - 20" monitor with resolutions up to 1600 x 1200 ni.....\$1039



CIRCLE 336 ON READER SERVICE CARD

Arlington
Computer
Products, inc.

101 Commerce Court, Suite 200, N. Andover, MA 01851
Hours (Central Time)
7:30am - 5:30pm / Monday - Friday
9:00am - 5:00pm / Saturday

800-548-5105

Shipping \$47-\$41-\$88
Technical Assistance \$47-\$41-\$88
Fax \$47-\$41-\$88

run into problems using this monitor with Windows? Where can I find a CGA driver for Windows 3.1?

P. SEBREE
Indianapolis, Indiana

PC MAGAZINE: Microsoft stopped shipping drivers for CGA and EGA displays with Windows 3.1, but the drivers are still available. You can download the file CGA.EXE from a number of sources, including the Microsoft Download Service, at 206-936-6735, or from the company's Web site, at www.microsoft.com/kb/soflib.

There are some severe limitations involved in using this display and driver combination, however. The CGA display does quite well for text-mode displays, but Windows does not use text, relying on graphics modes instead. And the CGA display adapter and monitor combination is extremely limited in terms of graphics capabilities. Here's a table of its graphic display modes:

Resolution	Number of Colors
320-by-200	4
640-by-200	2

The four-color mode has two palettes: red/green/brown/black and cyan/magenta/white/black. The two-color mode is simply black-and-white.

Compared with even the 640-by-480 resolution and 16 colors of a standard VGA display, the graphics modes offered by CGA are incredibly coarse and limited. When you consider that you can buy a new Super VGA monitor and adapter for less than \$250 (and refurbished sets for about \$150), it doesn't make sense to try and run an environment that is as information-dense as Windows 3.x on a display with such limited capabilities.

—Alfred Poor

Invisible Disk Drives

I just finished transferring all my computer's components from a desktop case to a tower case, and now the machine won't boot. The memory test completes successfully, and I can access my CMOS settings, which appear to be set correctly. The hard disks are getting power (they spin up and their power lights are on) and I've made certain that all the data and power cables are secure. But I can't even boot from the A: drive—the system seems unable to see or access any of the disk drives. What could be the problem?

SPIDER MCBRIDE
Worcester, Massachusetts

PC MAGAZINE: There certainly may have been a catastrophic failure of the controller card (or motherboard, if the drive ports are integrated there) as a result of static discharge during

handling or some other source of damage during the transfer process, but that wouldn't be my first guess in this situation.

If you have IDE hard disks and you attach the data cable the wrong way, your system may be unable to access any drives. Even though most data cable connectors on the disk drives are keyed—they have notches that are designed to line up with corresponding bumps on the data cable—most data cable connectors do not have the requisite bumps to take advantage of this physical alignment feature.

As a result, you're left on your own to make sure the data cable is attached correctly. Data ribbon cables all have a colored stripe along one edge, usually red or blue. This colored edge must be plugged into the connector at the Pin 1 end. You can identify the Pin 1 end in many cases because there is a 1 silk-screened onto the circuit board of the controller card (or motherboard) or the hard disk electronics. In some cases, there is no space to identify Pin 1, so there's a 2 next to Pin 2 on the other side of the dual row of pins. This marks the same end as Pin 1. In a few cases, you'll have to refer back to the documentation for the card or disk drive in order to identify which end of the connector has Pin 1. When you have all the connectors arranged correctly, I suspect that the system will boot properly.

This question was received some time ago via fax and obviously was of urgent importance to the sender. Unfortunately, it can take a long time for the answer to appear here—if the question gets answered at all. Note that you have a much better chance of getting a rapid response to your questions if you post them in the Solutions: Hardware section of the Utilities Forum in ZD Net on CompuServe. And a similar service will most likely be available on PC Magazine's Web site in the not-too-distant future.—Alfred Poor

OPERATING ENVIRONMENTS

Setting a Default Font For Write in Windows 3.1x



When I open a file with Microsoft Write under Windows 3.11, the text is always displayed in a font called Impact, which is very hard to read. I can select all the text and change the font to something else, but I don't want to do this for every file I open. Isn't there a way to tell Write that I always want to view files in, say, the Arial font?

TERRY ZIMMERMAN
Green Valley, Nevada

PC MAGAZINE: I can't explain the use of Impact as your default font, but I can commiserate: If I load Write for Windows 3.1 on my Windows

95 system, the default is Britannic Bold, another hard-to-read font. Write's fonts in Windows 3.0 were controlled by .INI file settings, but that doesn't work in Windows 3.1x. The official method for starting Write for Windows 3.1 with particular settings is to create a file containing those settings and then load it each time you start Write. Here's how:

- Start Write.
- Set the desired font, margins, and so forth.
- Press Space to insert a character using the font.
- Save the file as, for example, WRITEFNT.WRI.
- Exit Write.
- Make WRITEFNT.WRI a read-only file.
- Edit the Program Manager item that starts Write, changing its command line to WRITE .EXE WRITEFNT.WRI.

Now when you start Write, you'll automatically load the file containing your desired settings. And because the file is read-only, you won't be able to save over it accidentally.
—Neil J. Rubenking

Adding Viewers to Warp's WebExplorer

The Web Explorer included in the OS/2 Warp BonusPak is great, but there doesn't seem to be a way to add external applications. The "Configure Viewers" option allows me to change the applications for data types already defined, but how do I add new ones like RealAudio?

GEORGE MOODY
Albany, Georgia

PC MAGAZINE: It seems IBM must have believed it included all the file types that would ever be used, because there isn't an easy way to add new viewer applications. It can be done, though, if you don't mind getting your hands just a little bit dirty.

First, you need to locate your EXPLORE.INI file, which contains the WebExplorer settings. If you didn't change the defaults, you should find it in the \tcip\etc subdirectory. Open the file with your favorite text editor and look for the [advanced] section. You'll find a couple of entries that look like this:

```
mailcap=
extmap=
```

To register new data-stream types, you have to create new files that define the program that captures the data stream, and map the stream type to that application. You do that in the two files referenced here in EXPLORE.INI. Modify the two entries as shown below and save the configuration file:

```
mailcap=c:\tcip\etc\mailcap.txt
extmap=c:\tcip\etc\extmap.txt
```


MICROPOLIS

We are the #1 source for Micropolis Drives! Ask about our low price guarantee.

2 Gig

SCSI \$390
A/V \$450

Adaptec PCI only \$239
Adaptec Wide PCI only \$289
with Micropolis drive purchase!

2 Gig 7200RPM \$539

AV \$600

Wide \$630

Wide A/V \$689

4 Gig 7200RPM \$799

AV \$889

Wide \$889

Wide A/V \$979

9 Gig 5400RPM \$1579

AV \$1699

Wide \$1679

Wide A/V \$1799

9 Gig 7200RPM \$1799

NEW 3 1/2" Wide \$1899

Drives include 1 FREE cartridge.

100MB Zip \$195

1Gig Jaz internal \$379

1Gig Jaz external \$439

1Gig Jaz external (Iomega case) \$469

100MB Zip disks 2-4 \$20 5-9 \$17 10+ \$15

1Gig Jaz disks 2-4 \$99 5-9 \$95 10+ \$90

Turn a Hard Drive Into a Removable

Converts any 3 1/2" hard drive into a removable drive. Great for transportability, data interchange, or security needs. Extremely high quality construction. Metal cartridge and frame, cooling fan. Unit has SCSI ID select on the cartridge. Qty discounts available.

IDE System \$79 Extra Cartridge \$39 Extra Frame \$49

SCSI System \$85 Extra Cartridge \$40 Extra Frame \$54

WIDE SCSI System \$129 Extra Cartridge \$64 Extra Frame \$75

Weather resistant case to store and transport cartridge \$35

OPTICALS

All Optical Drive prices below include 1 FREE cartridge.

230MB Fujitsu IDE \$339

230MB Smart Storage Solutions SCSI \$339

640MB Smart Storage Solutions SCSI \$539

640MB Fujitsu (230MB backwards compatible) \$555

650MB PD ROM combination optical & 4XCD \$469

1.3Gig Maxoptix \$1039

2.6Gig Smart Storage Solutions \$1649

2.6Gig Maxoptix \$1789

2.6Gig Hewlett Packard \$2219

52Gig Maxoptix (does not include free disks) \$4549

REMOVABLES

New 540MB MCD drive is backwards compatible with SyQuest 270MB media.

540MB \$295 \$355 external



SyQuest drives include 1 FREE cartridge.

135MB external \$139 200MB int/ext \$399/\$459

230MB external \$299 270MB int/ext \$179/\$239

CD RECORDERS

BARE DRIVES

Smart Storage Solutions 2X Write 4X Read \$540

Yamaha 2X Write 4X Read \$550

Yamaha 4X Write 4X Read \$949

COMPLETE KITS

Smart Storage Solutions 2X Write 4X Read \$619

HP Ask about \$200 Rebate 2X Write 4X Read \$829

Pinnacle Micro 2X Write 4X Read \$Call

Smart & Friendly 2X Write 4X Read \$Call

Smart Storage Solutions 4X Write 4X Read \$1059

CD ROM DRIVES

SCSI

Brand Spin Model Speed Int Ext

NEC 4X CDR222 200ms \$99 \$189

Plexor 4.5X PX43CE 130ms \$230 \$320

Teac 6X CD56S 160ms \$155 \$245

Plexor 6X PX63CS 145ms \$269 \$359

Philips 8X PC80S 195ms \$225 \$315

NEC 8X CDR1410 145ms \$219 \$309

Plexor 8X PX83CS 115ms \$339 \$429

Pioneer 10X DRA10X 140ms \$239 \$329

ATAPI IDE

OEM 4X IDECD4X 200ms \$65 \$80

NEC 6X CDR1300 145ms \$79 \$94

Acer 8X AC885A 190ms \$99 \$114

Mitsumi 8X CRMCFX800 150ms \$120 \$135

Teac 8X CD58E 110ms \$115 \$130

Toshiba 8X XM5602B 145ms \$115 \$130

NEC 8X CDR1400 140ms \$150 \$165

Pioneer 10X DRA10X 140ms \$199 \$214

CD ROM CHANGERS

Internal IDE

Torisan 4X CDR3X4 3Disk 230ms \$89

NEC 4X CDR4X4 4Disk 250ms \$99

Internal SCSI

Nakamichi 8X MJ48S 4Disk 150ms \$549

External \$599

External SCSI

Pioneer 4.4X DRM-624X 6 Disk 190ms \$359

CD ROM TOWERS NEW! 16 Disk \$2899 28 Disk \$4899

NEW 10X Towers coming soon!

TAPE DRIVES

Capacity Brand & Model Price

2-4GB Seagate TSM4000 \$309

4-8GB Seagate TST8000 \$399

4mm DAT DRIVES

2GB Hewlett Packard C1534 \$609

2-4GB Seagate C4324RP \$679

2-4GB Hewlett Packard C1536 \$699

4-8GB Sony SDT5000 \$809

4-8GB Seagate C4326NP (DDS2) \$859

4-8GB Hewlett Packard C1533A \$999

4-8GB Sony SDT7000 TURBO SPEED! \$909

24-48GB HP External 6 tape loader C1553AX \$2299

32-64GB Sony TSL7000 8 tape autoloader \$2199

48-96GB Seagate C4586NP 12 tape autoloader \$2399

8mm DAT DRIVES

3.5-7GB Exabyte EXB8205XL \$1269

7-14GB Exabyte EXB8505XL \$1889

7-14GB Exabyte EXB8700LT \$1149

20-40GB Exabyte EXB8900 \$5499

70-140GB Exabyte EXB10H 10 tape autoloader \$5439

DLT DRIVES

15-30GB Quantum DLT2000 \$2499

QIC

800MB \$141

1GB \$159

1.7GB \$219

3.2GB \$249

4.4GB \$259

External for Printer Port

800MB \$259

1Gig \$269

Internal IDE

2-4Gig \$319

4-8Gig \$399



Price includes Windows backup software and 1 Free Tape.

Bundle Special!

Buy any tape drive with any hard drive and take \$10 off the total price.

IDE HARD DRIVES

IDE Speed RPM Brand Model Wty Price

540MB 14ms 3600 Seagate ST3541A 3 \$151

540MB 14ms 4480 Maxtor M7541A 3 \$159

639MB 10ms 4500 Western Digital AC2635 3 \$160

850MB 10ms 4500 Western Digital AC2850 3 \$165

850MB 14ms 3600 Seagate ST3851A 3 \$171

1080MB 11ms 4500 Fujitsu M1614T 3 \$165

1084MB 14ms 4480 Maxtor M71084A 2 \$185

1250MB 15ms 3600 Quantum BF1250A 3 \$175

1270MB 10.5ms 5400 Seagate ST51270A 3 \$187

1280MB 12ms 5400 Quantum FB1280A 3 \$198

1281MB 11ms 5200 Western Digital AC21200A 3 \$192

1336MB 11ms 4480 Maxtor M71336A 3 \$190

1620MB 14ms 3600 Seagate ST31621A 3 \$212

1624MB 10ms 5200 Western Digital AC31600 3 \$225

1625MB 10.5ms 5400 Seagate ST31640A 3 \$228

1626MB 11ms 4480 Maxtor M71626AP 3 \$220

1700MB 11ms 4500 Quantum SR31700A 3 \$218

2004MB 11ms 4480 Maxtor M72004A 3 \$265

2100MB 11ms 5200 Western Digital AC32100 3 \$285

2168MB 10.5ms 4500 Seagate ST32140A 3 \$262

2168MB 10.5ms 4500 Quantum TM32160A 3 \$270

2500MB 9ms 5400 Fujitsu M1638T 3 \$295

2550MB 15ms 3600 Quantum BF2500A 3 \$259

2550MB 11ms 4500 Quantum SR32550A 3 \$299

2559MB 11ms 5200 Western Digital AC32500 3 \$319

3166MB 12ms 5200 Western Digital AC33100 3 \$409

3254MB 10.5ms 4500 Quantum TM33200A 3 \$345

4250MB 10.5ms 5400 Seagate ST34250A 3 \$Call

2 1/2"

540MB 13ms 4200 Toshiba MK1924FC 1 \$229

810MB 13ms 4200 Toshiba MK1926FC 1 \$329

1350MB 13ms 4200 Toshiba MK2720FC 1 \$519

2100MB 13ms 4200 Toshiba MK2101MAN 1 \$699

SCSI HARD DRIVES

SCSI Speed RPM Brand Model Wty Int Ext

1050MB 9ms 5400 Seagate ST31055N 3 \$339 \$399

1080MB 12.5ms 5400 Seagate ST51080N 3 \$259 \$319

2147MB 9ms 5400 Seagate ST32155N 5 \$499 \$559

2147MB 8ms 7200 Seagate ST32550N 5 \$729 \$789

2150MB 8.5ms 7200 Quantum XP32150 5 \$639 \$699

4290MB 8ms 7200 Seagate ST15230N 5 \$889 \$949

4290MB 8ms 7200 Seagate ST15150N 5 \$Call \$Call

4300MB 8.6ms 7200 Quantum XP34300 5 \$900 \$960

9080MB 11ms 5400 Seagate ST410800N 5 \$1749 \$1849

WIDE SCSI

1070MB 8ms 7200 Quantum XP31070W 5 \$299 \$429

2147MB 8ms 7200 Seagate ST32550W 5 \$789 \$919

2150MB 9ms 5400 Seagate ST32155W 5 \$559 \$689

2150MB 8.5ms 7200 Quantum XP32150W 5 \$649 \$779

4294MB 8ms 7200 Seagate ST15150W 5 \$Call \$Call

4300MB 8.6ms 7200 Quantum XP34300W 5 \$919 \$1049

9100MB 11ms 5400 Seagate ST410800W 5 \$2029 \$2219

WIDE DIFFERENTIAL SCSI

4290MB 8ms 7200 Seagate ST15150WD 5 \$1279 \$1409

4294MB 8ms 7200 Micropolis MC3243WD 5 \$899 \$1029

9091MB 8.5ms 7200 Micropolis MC3391WD 5 \$1899 \$2029

9100MB 11ms 5400 Seagate ST410800WD 5 \$2129 \$2319

RAID SOLUTIONS

MegaHaus stocks a wide variety of hardware and software RAID solutions from top manufacturers; Adaptec, DPT, Raidtec, Stream Logic (formerly Micropolis Radion), Remus, and Tekram. Call for a quote on products or custom configurations.

Look for us on the Internet at:
<http://www.megahaus.com>



MegaHaus

2201 Pine Drive, Dickinson, Texas 77539

(713)534-3919 FAX (713)534-6580

Prices & specifications subject to change without notice. Shipping charges are nonrefundable. Returns must be in new condition and in original packaging. Defaced items may not be returned. No refunds on software or special orders (items not listed in ad). All refunds subject to 15% restocking fee. All trademarks are registered trademarks of their respective companies. Personal checks held for clearance. We reserve the right to refuse any sale for any reason. Bundle price good only if sold at ad price. ©1996 MegaHaus Inc.

10/22/96 PC Mag

SOLUTIONS

Ask Our Advisors

(If your EXPLORE.INI is in a different location, modify the path as needed.)

Now you need to create these two files. Again using your text editor, create a MAILCAP.TXT file. This file will contain an entry for each new data-stream type you want to register. The general format is

```
mime/type; application parameters %s
```

So to register RealAudio, for example, you would add a line like the following:

```
audio/x-pn-realaudio;  
➔c:\raplayer\raplayer.exe %s
```

You can add as many lines as you need to register all of your viewer applications. Save MAILCAP.TXT and then create the new mapping file, EXTMAP.TXT. This file defines the file extensions that are associated with the data-stream type you just registered. Each line has the general format

```
mime/type extension1 extension2 . . .
```

For the RealAudio application, you'd enter a line such as

```
audio/x-pn-realaudio ra ram
```

Save this new file as well. If WebExplorer is still open, you'll have to close and restart it for your changes to take effect. The next time you access a RealAudio site, your player should intercept it and begin playing automatically.

—Brian Proffitt

Processing Environment Variables in a FOR Loop

I'm trying to create a batch file to process a set of servers whose names are stored in an environment variable called SERVERLIST. The processing is supposed to occur in the following statement:

```
for %%s IN (%SERVERLIST%) do if  
➔"%%sF%"=="Y" call MAIN.BAT %%s
```

I want the if portion to test the value of an environment variable that is acting as a flag, indicating whether the server is available. For example, for member A of SERVERLIST, there's an environment variable named AF. If AF has the value Y, I'd like the string

```
%%sF%
```

to end up as Y. Instead, it is replaced with a single percent sign. I've tried different combinations of percent signs, but so far nothing seems

to work out the way I want. Can you show me how to accomplish what I need to do?

BRUCE DODDS

Newton Lower Falls, Massachusetts

PC MAGAZINE: To see why the batch line shown above doesn't work, you need to understand the steps COMMAND.COM goes through in executing a line. First, it processes the entire line, replacing double percent signs with single ones, environment variable names surrounded by percent signs with their values, and lone percent signs with nothing. COMMAND.COM performs this processing from left to right, one time only, before it begins to execute any commands on the line. The first two percent signs in the string

```
%%sF%
```

are replaced by a single percent sign, and the remainder,

```
%sF%
```

is replaced by nothing (the value of the environment variable sF). And all of this occurs before the for command begins to execute.

You need to eliminate that if test from the for command in question and test for the necessary environment variable within MAIN.BAT. If it's not found, just skip to the end of MAIN.BAT and don't process that particular server. Your original batch-file line will be replaced by:

```
for %%s IN (%SERVERLIST%) do call  
➔MAIN.BAT %%s
```

To check whether the desired variable exists, add a label named :End at the very end of MAIN.BAT, and insert these two lines at the very beginning:

```
SET | FIND /I "%1F=Y"  
IF ERRORLEVEL 1 GOTO END
```

The first line pipes the output of the set command through find, looking for a line showing the desired variable equal to Y. If that line isn't found, the next line jumps right to the end.—Neil J. Rubenking

WORD PROCESSING

Minimizing File Size in WP 6.1 for Windows



Every week, our office produces a crop weather report using a WordPerfect for Windows 6.1 file that we modify as needed. One page of the report contains a map that we change each week by opening the file, choosing Graphics | Edit Box, selecting

the box with the graphic, choosing the Content button on the Graphics Box toolbar, and entering the filename of the updated map in the Filename text box. Although the process works, the document file size increases by about 147K, almost double the number of bytes in the 85K image file. This happens every week.

WordPerfect technical support suggested turning off the option that saves the Undo and Redo items with the document. We tried this, but it made no difference in either the document size or its growth each week. Is there another way to minimize file size or is this just a bug in WordPerfect 6.1?

LORI REED

Nashville, Tennessee

PC MAGAZINE: It certainly appears to be a bug. And the way it works is so confusing, it took 2 hours of experimentation to be able to reproduce it at will and to understand both how to make the bloating show up and how to avoid it.

For those who aren't familiar with graphics boxes, it's worth mentioning that you can create one in WordPerfect 6.1 for Windows by choosing Graphics | Image, specifying a filename in the Insert Image dialog box, and choosing OK. Immediately after you add the box, and whenever you select it, you'll see eight small squares, or handles, on the perimeter of the graphic. You can grab any of these by moving the mouse cursor over a handle until it changes into a double-headed arrow that points left and right, up and down, or diagonally in both directions. Hold down the left mouse button to drag the handle, and you can stretch or shrink the image as needed.

Once you've inserted an image into a document, you can replace the graphic using the Graphics | Edit Box command, as described by Ms. Reed. If you've turned off the option to save the Undo and Redo items, you'd expect that if the replacement graphic was the same file size as the original, the modified document file should also be essentially the same size as the original file.

But it turns out that if you load the file, replace the graphic, and save the file without giving the command to close, the file will grow. If you then close the file, you're stuck with the new size. Oddly enough, however, my tests showed that the file grows only once each time you open it. After you replace the graphic and save the file once, you can replace the graphic and save the file any number of times without any further bloating. But if you close the file and reopen it, it will grow again the first time you replace the graphic and save the file.

The trick to making the document file stay the same size is to save it as you close it. After you make a change in the file, choose File | Close, and answer yes when WordPerfect asks

MORE PC LESS MONEY

- Intel® Enhanced PCI set
- 64-bit Video ATI 264 Series w/2MB RAM
- 16-bit Creative Labs Sound, with Wavetable Upgrade Option
- High Performance MPEG & CDi Full Screen Movie Playback
- Tool-free Ergonomic Mid-Tower or Slim-Desktop Case Enclosure
- Windows95 Pre-installed, with CD
- 104 key Windows95 Keyboard, Ergonomic Mouse

Up to 200MHz Clock Speed
PnP Flash BIOS, Super I/O Design

CLR Infinity PT5-A100

100MHz Pentium® Processor,
8MB EDO RAM, 256KB Pipelined Burst Cache,
1.7GB E-IDE Hard Drive, 6x CD-ROM E-IDE Drive,
14", N.I., 0.28mm Color Monitor

\$1399

CLR Infinity PT5-A133

133MHz Pentium® Processor, 16MB EDO RAM,
256KB Pipelined Burst Cache,
1.7 GB E-IDE Fast Hard Drive, 8x CD-ROM E-IDE Drive,
15", N.I., 0.28mm Color Monitor,
Lotus SmartSuite 96

\$1669
\$1925

with 166MHz

CLR Infinity PT5-A200

200MHz Pentium® Processor, 32MB EDO RAM,
256K Pipelined Burst Cache,
2.5 GB E-IDE Fast Hard Drive, 8x CD-ROM E-IDE Drive,
17", N.I. LR, 0.28mm Color Monitor,
Lotus SmartSuite 96

\$2695

CLR Infinity PT6-A200

200MHz Pentium® Pro Processor
256 KB Internal Cache
32MB Burst EDO RAM,
2.5 GB E-IDE Fast Hard Drive, 12x CD-ROM E-IDE Drive,
17", N.I. LR, 0.28mm Color Monitor,
Windows NT Workstation Pre-installed, with CD
Lotus SmartSuite 96

\$3350
\$3895

with 512 KB Internal L2 Cache

Options (all systems)

15" - 17" Monitor Upgrade	\$340
28.8 Fax/Data Modem	\$115
8MB EDO RAM	\$70
Altec Lansing Subwoofer	\$149
SCSI Options	call
128bit Video Options	call

CIRCLE 387 ON READER SERVICE CARD

OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

CALL NOW TO ORDER



1-800-611-1555
Internet <http://www.clrusa.com>

Mon - Fri 9am to 9pm EST
Business Lease Available



(C) CompuLink Research, Inc. All prices and specifications are subject to change without notice. CompuLink Research, Inc. cannot be held responsible for omissions/errors in typographic or photographic reproduction. Your selection to quality and technology without compromise and the CLR logo are trademarks of CompuLink Research, Inc. Intel and Intel Inside are registered trademarks of Intel Corporation. Microsoft is a registered trademark, and Windows, Windows95 and Windows/NT and the Windows logo are trademarks of Microsoft Corporation. All other trademarks or tradenames are the property of the respective companies. 30-day money back guarantee. Business lease requires 3-year term (year 3 must be shipped in the original packaging and condition, prepaid and insured).

All models include

- Latest Technology
- Top Performance
- Best Price
- Aesthetically Detailed Design
- Ease of Access to Internal Components
- Simple Cost-Effective Upgrade
- 3 Year Limited Warranty
- 30 Day Money Back Guarantee

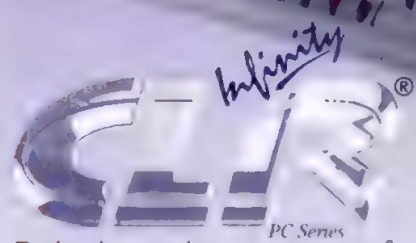


The CLR Infinity delivers
Top-flight performance
at a good price.

PC Magazine, January 22, 1996



CompuLink Research, Inc.
3949 Commerce Parkway
Miramar, FL 33025
Tel: 954-450-7061 Fax: 954-450-7062
BBS: 954-450-8056



Technology without compromise®

CompuLink Research, Inc.
3949 Commerce Parkway
Miramar, FL 33025

Tel: 954-450-7061 Fax: 954-450-7062
BBS: 954-450-8056

**Satellite** 110CS & 110CT

Satellite 110CS & 110CT

- 100MHz Pentium® Processor
- 810MB Hard Drive

110CS 11.5" Dual Scan PA1224C-324 **\$1979**

110CT 11.5" Active PA1224U-724 **\$2479**



Modems/PC Cards

MAGAZINE BY ITS ROBOTICS PC CARD		BIOCA BUS	
28.8 X 1 Ethernet Controller XJEM128BT	\$300	Office Communication 28.8 D1-DVSP34	\$130
28.8 X 100Mbit 10Mbit/Cell XJEM328C	\$320	SoundExpression 28.8 D1-SE34S	\$200
28.8 X 14.4 Fax Cell Capable XJ28B	\$119	HAYES BUS	
28.8 Cable 14.4 Fax Cellular CRJ28B	\$330	Accura 33.6 SmartCom Software H9-0278	\$40
IS ROBOTICS PC CARD		Accura 33.6 SmartCom Software H9-0276	\$40
28.8 Cable 14.4 Fax Dataview GR001015	\$280	PRACTICAL PERIPHERALS BUS	
SIMPLE TECHNOLOGIES PC CARD		V.34 28.8 Data/Fax Internet PM288HCINET	\$129
28.8 Simplex 14.4 Fax STI FAX288SC	\$445	V.34 28.8 Data/Fax Internet PM288MTNET	\$140
HAYES BUS		IS ROBOTICS BUS	
Optima 33.6 EZJazz SmartCom H9-0260	\$230	Sprinter 28.8 Software SP-000840	\$180
PRACTICAL PERIPHERALS PC CARD		Sprinter 28.8 Software SP-000839	\$180
Proclass 28.8 Cable PL288T2	\$217	Sprinter V1 DSV2 Voice & Data SP-000980	\$100
Proclass 28.8 EZJazz PC288T2 EZ	\$217	Sprinter WINMODEM Win 95 SP-001125	\$100
CONNECTWARE PC CARD		Sprinter Voice 28.8 SP-001171	\$160
FinmeWorks 33.6 To Fax Cable PGT060288	\$280	COURIER EVERYTHING CR-001172	\$180
CREATIVE LABS PC CARD		COURIER EVERYTHING CR-001223	\$230
ModemLinker 28.8 Cable MR288PMICA	\$230	COURIER EVERYTHING CR-001224	\$230

Printers...Laser/Ink Jet/Dot Matrix

HP PRINTERS		OKIDATA PRINTERS	
DeskJet 340 Bundle (incl. color ink & battery)	199/299	Okidata 4W (Windows Only)	299
DeskJet 400C/580C Printer	189/299	ML600e/ML610e/ML630e	399/499/799
DeskJet 820C/870 Cxi	379/499	ML320/ML321	319/449

Winter 1988/1989 ML590/ML591

Deskjet 1600 <i>ACM Printer</i>	\$789/\$849	MSJ900 MSJ91	\$449/\$699
Laureljet 16-PS	\$399		
Laureljet 16-PS/MP	\$789/\$809		
OfficeJet 350 <i>(Printer/Fax/Copier/Scanner)</i>	\$79		
Fax 700 Fax/Copier Value Pack	\$499		
EPSON			
EX300	\$169		
LQ-870/1070*	\$455/\$555		
FX-870/11070*10	\$89/\$79/\$99		
LQ-870/2170	\$477/\$599		
DFX-5000+/8000	\$1395/\$2329		
		HCJ-210	\$149
		HCJ-240	\$179
		AJC-4100	CALL
		HCJ-4200	\$279
		AJC-4550 <i>(wide carriage)</i>	\$499
		HCJ-615	\$589
		HCJ-630	\$589
		IMP-615 <i>(Laser)</i>	\$599
		C2500 <i>(Fax, Scanner, Printer, Copier)</i>	\$899
LEXMARK			

Desktops Systems

IBM Aptiva		FLEX Systems	
C53, P133, 16MB, 1.6GB	*1890	The Flex Delegate, P-Pro80, 16MB, 1GB, MT, KX, 17"	*2785
C55, P150, 16MB, 256K, 2GB	*2340	Multimedia Tower P-Pro200, 32MB, 1GB, KX, 17" B/C240	*3785
C65, P166, 16MB, 256K, 2GB	*2490	Flex Family Classic, P133, 16MB, 1GB, DT or MT, KX, 15"	*1890
C87, P166, 16MB, 256K, 2GB	*2490	Multimedia Classic, P166, 16MB, 2GB, DT or MT, KX, 15"	*2785
P35, P200, 16MB, 256K, 1.5GB	*2890	HomeOffice Select, P166, 16MB, 2GB, MT, 17", HL/270	*3290
C77, P200, 32MB, 256K, 3.2GB	*3290	Business Workstations starting at	*1890
<i>Full line of IBM Monitors Available!</i>			
HP Vectra 500 Series		AST Advantage!	
510CD, 5100 P100, 8MB, 1.2GB, AX	*1230	9904, P133, 24MB, 1GB, KX, 33.6"	*1655
510CD, 5133, P133, 8MB, 1.6GB	*1240	9300 P166, 31MB 2GB, KX, 33.6"	*2020
5150MCX, 5133, P133, 8MB, 1.2GB, AX, Sound, Teletphony	*1440	9316, P200, 24MB, 4GB, KX, 33.6"	*2620
5150MCX, 5133, P133, 16MB, 256K, 1.6GB, KX, Sound, Teletphony	*1850	NEW! AST Systems Optimized for Specific Needs!	
5150MCX, 5166, P166, 16MB, 256K, 2GB, KX, Sound, Teletphony	*2340	9310 P166, 24MB, Optimized for HomeOffice/Small Business	*2300
		9312, P166, 24MB, Optimized for Communications/Video	*2610
		9315, P200, 32MB, Optimized for Serious Gaming	*2490

Notebook Computers

EVEREX ExpressNote™ Series		
P100, 10.4" DS, CD-ROM opt., 810MB		*1999
P100, 10.4" Act., CD-ROM opt., 810MB		*2499
P100, 10.4" Act., 4X CD-ROM, 810MB		*2899
P100, 11.3" Act., CD-ROM opt., 810MB		*3399
P120, 11.3" Act., 4X CD-ROM, 810MB		*3899
P120, 11.3" Act., 4X CD-ROM, 1.3GB		*4499
P133, 11.3" Act., 4X CD-ROM, 1.3GB		*4999

TARGUS
INSTANT 20% off

USE WITH ANY PURCHASE
EXPIRES 12/31/95

OLIVETTI ExpressNote™

REFLEX

Check out these Absolutely Lowest Prices on
Manufacturer Certified Remanufactured Products
and Special End-of-Life Close-Out Deals!



**TEXAS
INSTRUMENTS**
Extensa™ 565CD
75° Pentium® 75, 10.4" DS
Integrated 4X CD ROM,
810MB, RAMB RAM
\$1499



Satellite Pro
Satellite Pro 415CS
Pentium® 90, 910MM, SMI
11.3" DS ~~\$1999~~



TOSHIBA



brother
HL-630 Laser
300dpi, 6 ppm
straight paper path
1 Year factory
Warranty
Factor! Refurbished



ALPS
**Incredible
4 Disc Changer!**
600K/s transfer rate
1.28K buffer
removable 4 disc
magazines incl
ISA IDE/ATAPI I/O



HP LaserJet 4
Complete kit
Complete kit w/2 CDs
Rare Drive w/Installation Software Only
Extra Magazines

While Supplies Last

[illegible]

20,000 computer products **USA**

✓ Notebooks ✓ Desktops ✓ Printers & Scanners ✓ Networking ✓ Software ✓ Video ✓ Multimedia

You know what you want in a computer...now you know where to get it.

Easy Internet Access

You want Web access? Push a button.
It's that simple.

Lots of Cool Software

Here's a little of it: Lotus® SmartSuite™, VR Soccer™, MechWarrior 2™, and The Lost Mind of Dr. Brain™.

Service and Support

Online Housecall. Around-the-clock help.
Consider it found.

More Power
Get pumped. Aptiva has Pentium™ processors of up to 200MHz.

Total Image Video™
Aptiva features full-motion video that's bigger and better than ever, true-to-life full-screen action.

IBM® Aptiva

3-D Total Image
Aptiva's built-in 3-D graphics makes for mind-blowing action. Wanna play?

TheatreSound™
With tower speakers and a Waveable Sound card, your ears will be thrilled.

Starting at

\$1999*

The New IBM® Aptiva™

Your pathway to exciting worlds of vibrant new videos and dynamic sounds. It's your connection to entirely new worlds of people, places & information. It's packed with power & IBM technology. It's easy to use and fun. It's an interactive PC for entertainment, education, communications & productivity.

How does it do all this? Two separate processors—a Pentium™ microprocessor plus IBM's powerful media processor. The result? Faster performance, higher quality images, & richer musical sounds.

Experience Total Image 3-D™, Total Image Video™, TheatreSound™. Experience total interactivity—new ways to stay in touch. Your Aptiva is a phone, an answering machine, a fax machine, and a modem. Use your Aptiva to connect to the Internet to visit places around the world. Experience IBM reliability & quality, & IBM's customer support services like 24-hour HelpWare™, Online Housecall, & a three-year limited system board warranty.

These IBM Aptiva models are all fully equipped with 8X CD-ROM drives, 3D graphics with 2MB RAM, full 16bit waveable sound, tower-style speakers, microphone & a 28.8 data/fax modem. Plus, they are loaded with award-winning software to make everyday activities easier & more enjoyable.

IBM Aptiva Models

Model	CPU/MHz	Memory	L2 Cache	Hard Drive	Part #	Price
Aptiva C33	Pentium 133	16MB	Optional	1.6GB	2176-C33	\$1999
Aptiva C55	Pentium 150	16MB	256KB	2.0GB	2176-C55	\$2249
Aptiva C65	Pentium 166	16MB	256KB	2.0GB	2176-C65	\$2449
Aptiva C67	Pentium 166	16MB	256KB	2.5GB	2176-C67	\$2499
Aptiva C73	Pentium 200	16MB	256KB	2.5GB	2176-C73	\$2899
Aptiva C77	Pentium 200	32MB	256KB	3.2GB	2176-C77	\$3299

Systems incl. mid-tower style case w/6 drive bays (1 open) 145W power supply. Slots: 7 total slots 2-PCI. IBM is a registered trademark and Aptiva is a trademark of International Business Machines Corporation.

IBM Monitors

Model	Tube Size	Visible Image Size	Part #	Price
G40	14"	13"	6542103	\$299
G41	14"	13"	6542301	\$309
G50	15"	13.4"	6543301	\$359
G70	17"	15.7"	6544403	\$519
G200	20"	18.4"	6545603	\$1499

*Monitors not included w/IBM Aptiva. All IBM Monitors listed have 28mm dot pitch.

HITACHI

Hitachi E Series

Light. Thin. Full-featured.

The Hitachi E-Series 100D notebook is communications-ready notebook designed for the small business professional. It offers the greatest price/performance value in the retail market and the fastest video performance via Neo Magic 2070. It also offers customer flexibility through a dual battery, mixed chemistry capability.

Hitachi E Series 100D

The Hitachi E-Series 100D gives you 100MHz Pentium power, with a large 11.3" full color flat panel 800x600 dual scan (DSTN) display. It comes with 8MB EDO DRAM and an 810MB hard drive. Hitachi E-Series 100D Notebook Computer Processor: Intel Pentium 100MHz Display: 11.3" Dual Scan (DSTN) Matrix Size 11.3"x9.0"x1.62" Weight: 5.8lbs Battery: Nickel Metal Hydride (Also supports Lithium-Ion DRAM: 8MB EDO DRAM Maximum DRAM: 40MB EDO DRAM Hard Drive: 810MB CD-ROM Ext. avail. LAN: N/A Sound: Sound Blaster Compatible with Speaker AC Adapter: External

E1001A

\$1999

Hitachi E Series 133T

For the mobile professional who needs maximum speed and power, the Hitachi E-Series 133T notebook offers a 133MHz Pentium processor with an 11.3" full color flat panel 800x600 (TFT) display, 16MB EDO DRAM and an 810MB hard drive • 11.3"x9.0"x1.62" • 5.8lbs • Battery: Nickel Metal Hydride (Also supports Lithium-Ion) • CD-ROM Ext. Avail. • SoundBlaster Pro Compatible with Speaker • AC Adapter: External

E1002A

\$2999

Hitachi M Series 120T

For the professional who needs speed and power, the Hitachi M-Series 120T notebook offers a 120 MHz Pentium processor with a large 11.8" full color flat panel 800x600 TFT active matrix display, 16 MB EDO DRAM, and 1GB hard drive. • Slide hinge design • 12"x9"x2.1" • 6lbs. 3oz. • Battery: NiMH • Removable 6X CD-ROM • LAN: Integrated 10BaseT port • SoundBlaster Pro TM Compatible with Stereo Speakers • AC Adapter: Built In.

G1143A

\$4499

Hitachi M Series 133T

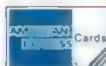
The fastest in multimedia computing, the Hitachi M-Series 133T notebook gives you blazing 133 MHz Pentium processor, a removable 6X CD-ROM drive, with an 11.8" full color flat panel 800x600 TFT active matrix display, 16MB EDO DRAM, and 1GB hard drive • Slide hinge design • 12"x9"x2.16" • 6lbs. 3oz. • Battery: NiMH • Removable 6X CD-ROM • LAN: Integrated 10BaseT port • SoundBlaster Pro TM Compatible with Stereo Speakers • AC Adapter: Built In.

G1144A

\$4999



No Surcharge On These Credit Cards



To order, call...

1-800-333-4515

CIRCLE 051 ON READER SERVICE CARD

Code # PM1086 Please refer to this code when ordering.

whether to save the changes.

There's one variation of which you should also be aware. If you've replaced the graphic and saved the file so that it has grown in size, you can still return to the original size, as long as you make some other change before giving the File | Close command. Even if you simply add a space and delete it before choosing File | Close, WordPerfect will ask whether to save the changes to the file. Answer yes, and the file will return to its original size. But once you close the file after it's grown, the only way to reduce the file size is to open a new, blank file, copy the contents of the original file to the new file, and save it.

A final point: This sort of application seems tailor-made for WordPerfect's Image on Disk feature. When you choose Graphics | Image and specify a graphic file to use, you'll find a check box labeled Image on Disk at the lower-right-hand corner of the Insert Image dialog box. If you check this box before choosing OK, WordPerfect will not store a copy of the image in the document file. Instead, it will read the image from disk in order to show the image in your document.

You can save a lot of disk space this way. In my tests, when I used the Image on Disk option, the file size dropped from 85K to under 3K. Even better, you can change the image in the document without having to change anything in the document itself. Simply rename the original graphic file or delete it, and give the new graphic file the same name with which the original started. The next time you load the document, WordPerfect will look for the graphic file by name and find the new version instead of the original.—*M. David Stone*

SPREADSHEETS

E for Error?

 Here's a warning for users of Lotus 1-2-3 for Windows, Release 5: A text entry beginning with a number and ending with an E or e will not be recognized as a label. Instead, the E gets truncated and 1-2-3 turns the intended label into a numeric entry. For example, the label 15E turns into the number 15. This leads me to wonder what other cell entries may be misrepresented in the spreadsheet!

STEVEN LEUNG
Fort Myers, Florida

PC MAGAZINE: Longtime 1-2-3 users will no doubt remember that for all of its life as a DOS spreadsheet, 1-2-3 simply rejected any entries that began with a number and ended with text. To enter a label such as 123 Maple Street, you had to begin by typing a label prefix character: an apostrophe for left alignment, a caret for a centered label, or a quotation mark to have the label aligned flush right.

Lotus 1-2-3 is friendlier now; it sees what you're trying to do and adds a label prefix character for you. But Lotus apparently overlooked one detail. The character E (capitalized or not) stands for exponent, and is used as a shorthand way of entering very large or small numbers. Thus, for example, to enter the number 15,000,000,000, you can type

15E9

1-2-3 understands that you mean 15 multiplied by 10 raised to the ninth power.

Unfortunately, if you just type 15E, 1-2-3 thinks (inappropriately, in my opinion) that you mean 15 multiplied by 10 to the power of 0. Ten to the power of 0 is 1, so 1-2-3 displays the result: 15.

The solution is to dust off your 1-2-3 for DOS habits (or acquire them for the first time, as the case may be), and precede your label with a prefix character.—*Craig Stinson*

DATABASES

Toggling Postal-Code Masks in Microsoft Access

 Some of my clients have customers in both Canada and the U.S. When entering information on a form, they like the convenience of using an input mask for postal codes, but each country's code requires a different mask. To provide both masks, I put a command button on the form beside the postal code control and use a simple routine to toggle between the Canadian and U.S. input masks. I also change the label text to indicate which mask is in use.

For example, let's call the postal-code control PostalCode. First, set its Input Mask property to

00000-9999;0;_

and name its label PostalCodeLabel. Then, place a command button on your form next to the PostalCode control and name it cmdMask. In the On Click event of cmdMask, place the code shown in Figure 1.

```
Sub cmdMask_Click ()
On Error Resume Next
If Me!PostalCode.InputMask = "00000\~9999;0;_" Then
Me!PostalCode.InputMask = ">?9? \ 979;0;_"
Me!PostalCodeLabel.Caption = "Postal Code"
Else
Me!PostalCode.InputMask = "00000\~9999;0;_"
Me!PostalCodeLabel.Caption = "ZIP Code"
End If
Me!PostalCode.SetFocus
End Sub
```

FIGURE 1: With a command button and the code shown here an Access user can toggle between Canadian and U.S. postal-code masks. Figure 3, however, shows a better technique.

Now, when you click the cmdMask button, Access checks to see which mask is assigned to PostalCode, and then changes it to the alternate mask. It also changes the label caption to indicate to the user which mask is in place (either "Postal Code" or "Zip Code"). The last line of code returns the focus to the PostalCode control so the form is ready to accept input.

If you set the label for the cmdMask button to "Mas&k" you can press Alt-K to toggle the mask and your hands won't have to leave the keyboard.

This routine was written for Access 2.0.

JOHN RUDSON
Pickering, Ontario, Canada

PC MAGAZINE: Using a command button to toggle the input mask settings is a valid approach, but I prefer an alternative technique. Instead of using a command button to change the input masks, include a Country field in your table, then set up Access to change the input masks automatically, based on the value in the Country field. For example, if you set up your form similarly to the one shown in Figure 2, you can have Access customize the input masks whenever the form is loaded and thereafter whenever a country is chosen in the Country combo box. Figure 3 shows code that

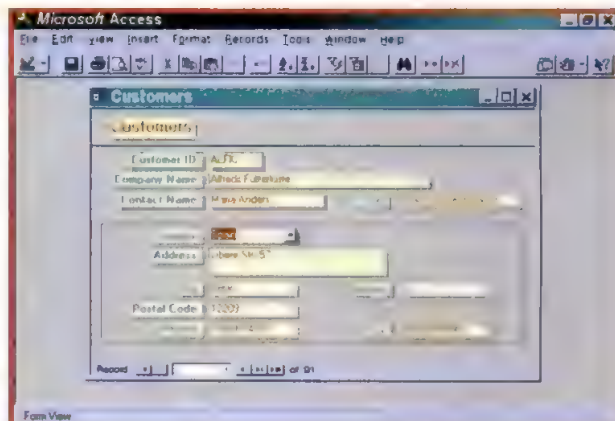


FIGURE 2: If you place a Country field in your table such as the one shown here, you can then include code in your Access forms to change input masks for postal codes and telephone numbers automatically, based on the value in the Country field.

COMPLEAT SATISFACTION

PCs
COMPLEAT
A COMPUSA® COMPANY
800-341-4606

TOSHIBA

Satellite 110

- Pentium 100MHz processors
- 11.3" Dual Scan and Active Matrix displays
- Built-in M. adapter
- Fast system performance with EDO RAM memory

Processor	Screen	RAM/HD	Price
Pentium 100	11.3" Dual Scan SVGA	8/772MB	\$1999
Pentium 100	11.3" Active SVGA	8/772MB	2499

"The display of the Tecra 720 is nothing short of stunning."
—Windows, June 1996

Tecra 720

- Pentium 133MHz processor
- Built-in 28.8 fax/modem
- Built-in 6X CD-ROM drive
- Optional DeskStation capabilities

Processor	Screen	RAM/HD	Price
Pentium 133	12.1" Active SVGA	16MB/1.1GB	\$5399



Tecra 720

UNBELIEVABLE PRICES ON TOSHIBA
Toshiba Refurbished Notebooks Call for details.

Tecra 730

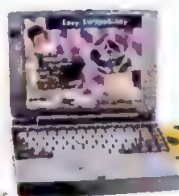
- Pentium 150MHz processor*
- 6X CD-ROM drive and audio
- 28.8 fax/modem with speakerphone
- 1280x1024 external resolution

Processor	Screen	RAM/HD	Price
Pentium 150	12.1" Active SVGA	16MB/2GB	\$6099



Tecra 730

Satellite Pro 420



Satellite Pro 420

- Pentium 100MHz processor
- Built-in 6X CD-ROM drive
- 11.3" Dual Scan & Active Matrix displays
- Built-in SoundBlaster Pro compatible audio

Processor	Screen	RAM/HD	Price
Pentium 100	11.3" Dual Scan SVGA	8/772MB	\$2499
Pentium 100	11.3" Active SVGA	8MB/1.2GB	3299

Portégé 650

- 133MHz processor
- Built-in 28.8 fax/modem
- 16-bit SoundBlaster
- Built-in compatible audio
- Up to 11.5" Active Matrix display

Processor	Screen	RAM/HD	Price
Pentium 133	11.3" Active SVGA	16MB/1.2GB	\$4499



Portégé 650

Tecra 500

- Pentium 120MHz processor
- Built-in 6X CD-ROM drive on 500CPT optional accessory on Tecra 500CS
- 16MB EDO RAM memory
- 12.1" Super VGA displays

Processor	Screen	RAM/HD	Price
Pentium 120	12.1" Dual Scan SVGA	16MB/1.3GB	\$3699
Pentium 120	12.1" Active SVGA	16MB/1.3GB	4699*



Tecra 500

* Features 6X CD-ROM drive

FUJITSU
PC Corporation

HOT NEW PRODUCTS!

Montego Notebook

- 4.9 lb weight
- EDO RAM memory
- Built-in 16-bit SoundBlaster compatible audio
- 100MHz Pentium processor
- 28.8 PCMCIA fax/modem

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Active SVGA	8MB/1GB	\$2999



Montego Notebook

Milan Notebook

- Up to 133MHz Pentium processors
- Up to 11.5" Super VGA displays
- Built-in 16-bit SoundBlaster audio
- Only 1.7" thick and 5.5 lbs



Milan Notebook

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Dual Scan SVGA	8/810MB	\$1799 †
Pentium 100	10.4" Dual Scan SVGA	8/810MB	1799 *
Pentium 100	10.4" Active SVGA	8/810MB	2499 †
Pentium 100	10.4" Active SVGA	8/810MB	2499 *
Pentium 120	11.3" Active SVGA	8MB/1.2GB	3199 †
Pentium 120	11.3" Active SVGA	8MB/1.2GB	3199 *
Pentium 120	11.3" Active SVGA	8MB/1.2GB	3349 *
Pentium 133	11.3" Active SVGA	16MB/1.2GB	3699 †
Pentium 133	11.3" Active SVGA	16MB/1.2GB	3699 *
Pentium 133	11.3" Active SVGA	16MB/1.2GB	3849 *

* Features 28.8 PCMCIA fax/modem

† Features Windows for Workgroups OR Windows 95

Engineered for Mobile Comfort

Monte Carlo Notebook

- Up to 133MHz Pentium processors
- Built-in 6X CD-ROM drive
- 2MB video memory
- 16MB RAM memory on selected models



Monte Carlo Notebook

Processor	Screen	RAM/HD	Price
Pentium 100	11.3" Active SVGA	8/810MB	\$2999 †
Pentium 100	11.3" Active SVGA	8/810MB	2999 *
Pentium 100	11.3" Active SVGA	8/810MB	3149 *
Pentium 120	11.3" Active SVGA	16MB/1GB	3699 †
Pentium 120	11.3" Active SVGA	16MB/1GB	3699 *
Pentium 120	11.3" Active SVGA	16MB/1GB	3849 *
Pentium 133	12.1" Active SVGA	16MB/1GB	4499 †
Pentium 133	12.1" Active SVGA	16MB/1GB	4499 *
Pentium 133	12.1" Active SVGA	16MB/1GB	4649 *

* Features 28.8 PCMCIA fax/modem

† Features Windows for Workgroups OR Windows 95

© 1996 PCs Compleat. All prices and specifications subject to change and do not include shipping. All products or brand names are trademarks of their respective companies. PCs Compleat, 34 St. Martin Drive, Marlborough, MA 01752-3021. Phone: 800-341-4606. Not responsible for any damage to your computer or data. All trademarks and registered trademarks are the property of their respective owners. * Features 28.8 PCMCIA fax/modem. † Features Windows for Workgroups OR Windows 95.

More Brand Names, Peripherals and Software available. If you don't see it, CALL!

International: 508-624-6400
Email: sales@pcscorpleat.com
Visit us at www.pcscorpleat.com

Open 7am-Midnight weekdays, 9am-9pm weekends and holidays.

800-341-4606

PCs
COMPLEAT
A COMPUSA® COMPANY
800-341-4606

CALL
for
Guaranteed
Lowest
Price
on
Systems*
*Call for details

Call
for a
FREE
PRODUCT
GUIDE

THE BEST BRANDS

NEC



Call about
factory savings
on NEC factory
refurbished
products.

NEC Versa 6000

NEC Versa 6000

- Up to Pentium 133MHz processors
- Built-in 6X CD-ROM drive
- 2MB video memory
- Built-in 28.8 cellular fax/modem

NOW AVAILABLE
Versa 2400
Call for details.

Processor	Screen	RAM/HD	Price
Pentium 100	12.1" Active SVGA	16MB/1.1GB	\$3999
Pentium 133	12.1" Active SVGA	16MB/1.3GB	4999
Pentium 133	12.1" Active SVGA	16MB/1.4GB	5399



NEC Versa 4200

- Pentium 100 and 133MHz processors
- SoundBlaster Pro compatible audio with 2 speakers
- With VersaBay II for optional 2nd battery or CD-ROM
- Full screen MPEG video, 4 audio ports and mic

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Active SVGA	8/810MB	\$2999
Pentium 133	10.4" Active SVGA	8MB/1.0GB	3899

NEC Versa 4200

FREE! SMD Memory Module with the purchase of an NEC Versa 4200 offer valid 9/1/96-10/31/96

COMPAQ



Armada

Compaq Armada

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Dual Scan	8/810MB	\$1879
Pentium 100	10.4" Active	8/810MB	2199
Pentium 100	11.3" Dual Scan SVGA	8/810MB	2479*
Pentium 100	11.3" Dual Scan SVGA	8/810MB	2899*
Pentium 120	11.3" Dual Scan SVGA	16MB/1.1GB	2999*
Pentium 120	11.8" Active SVGA	16/810MB	3699*
Pentium 133	11.8" Active SVGA	16MB/1.1GB	4399*

* Features built-in audio
† Includes 4X CD-ROM drive

LTE 5000 Series

Processor	Screen	RAM/HD	Price
Pentium 100	11.3" Dual Scan SVGA	8/810MB	\$2849
Pentium 120	10.4" Active SVGA	16/810MB	3599
Pentium 120	11.3" Active SVGA	16MB/1.35GB	4349
Pentium 120	10.4" Active	8MB/1.35GB	4720
Pentium 133	12.1" Active SVGA	16MB/1.35GB	4749
Pentium 133	12.1" Active SVGA	16MB/2.2GB	6299

LTE 5000 Series



TEXAS INSTRUMENTS



Extensa 570

Extensa 510/570

- 100MHz Pentium processor
- Built-in 6X CD-ROM drive on 570 models only
- Windows for Workgroups or Windows 95
- Built-in 16-bit audio, speaker and microphone

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Dual Scan	8/810MB	\$1749
Pentium 100	11.3" Dual Scan	8/810MB	2249*
Pentium 100	10.4" Active	8MB/1.2GB	2939*
Pentium 100	10.4" Active	8MB/2.0GB	3429*

* Features 6X CD-ROM drive

TravelMate 6000

- Up to 150MHz Pentium processors!
- Up to 12.1" Super VGA Active Matrix displays
- Built-in 28.8 fax/modem
- 2MB video memory

Processor	Screen	RAM/HD	Price
Pentium 120	11.3" Active SVGA	8MB/1.08GB	\$4099
Pentium 133	12.1" Active SVGA	16MB/1.35GB	4889
Pentium 150	12.1" Active SVGA	16MB/1.35GB	5379

TravelMate 6000



IBM

ThinkPad® 365X/XD

- Pentium 100 & 120MHz processors
- Built-in 4X CD-ROM drive on 365XD
- 10.4" & 11.3" SVGA displays
- 32 bit PCI local bus graphics
- 16 bit sound, speakers and microphone on 365XD
- Infrared port for wireless communications
- External floppy drive on 365XD

ThinkPad® 365X/XD

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Dual Scan SVGA	8/810MB	\$1999
Pentium 100	11.3" Dual Scan SVGA	8/810MB	2299*
Pentium 100	11.3" Active SVGA	8/810MB	2399
Pentium 120	11.3" Dual Scan SVGA	8MB/1.1GB	2549*
Pentium 120	11.3" Active SVGA	8MB/1.1GB	2949*

* ThinkPad® includes built-in 4X CD-ROM drive

Call about
ThinkPad® 760 Models!

ThinkPad® 560

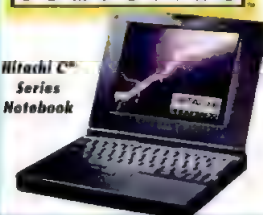
- Only 4 lbs and 1.2" thick!
- Up to 133MHz Pentium processors
- 11.3" & 12.1" SVGA displays
- Built-in 16 bit SoundBlaster compatible audio
- External floppy drive reduces weight
- EDO RAM memory enhances performance
- Infrared transceiver for wireless communication

Processor	Screen	RAM/HD	Price
Pentium 100	11.3" Dual Scan SVGA	8/810MB	\$2699
Pentium 120	12.1" Active SVGA	8/810MB	3749
Pentium 133	12.1" Active SVGA	8MB/1.1GB	4199

ThinkPad® 560



HITACHI



Hitachi C®
Series
Notebook

Hitachi C™ Series

- Built-in 28.8 data/fax/modem
- Up to 11.8" Super VGA displays
- Only 1.6" thick and 5.3 lbs
- 5-year warranty

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Active SVGA	8/720MB	\$2799
Pentium 100	10.4" Active SVGA	8/720MB	2799*
Pentium 120	11.8" Active SVGA	8MB/1GB	3199
Pentium 120	11.8" Active SVGA	8MB/1GB	3199*

* Features Windows for Workgroups

Hitachi M™ Series

- Integrated 10 Base-T Ethernet card
- Built-in 28.8 data/fax/modem
- SoundBlaster Pro compatible audio
- Built-in 4X and 6X CD-ROM drives

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Active SVGA	8/720MB	\$2799
Pentium 100	10.4" Active SVGA	8/720MB	2799*
Pentium 120	11.8" Active SVGA	16MB/1GB	4499
Pentium 120	11.8" Active SVGA	16MB/1GB	4499*
Pentium 133	11.8" Active SVGA	16MB/1GB	4999
Pentium 133	11.8" Active SVGA	16MB/1GB	4999*

* Features Windows for Workgroups



Hitachi M® Series Notebook

ONLY at PCs COMPLEAT **Lowest Price Guarantee** **30-Day Money Back Guarantee** **Free Tech Support** **Free Software Installation** **Free Configuration**

NOTEBOOK AROUND!

We Carry Over
30,000
Products!
Call Today!

PCs
COMPLEAT
A COMPUSA® COMPANY
800-341-4606

AST
Authorized Reseller

AST Ascentia P

- Pentium 120 and 133MHz processors
- 6X CD-ROM drive and 16-bit audio chipset
- Up to 12.1" 800 x 600 displays
- Up to 24MB of RAM memory standard
- Built-in 28.8 data fax modem

Processor	Display	RAM	Price
Pentium 120	11.3" Active SVGA	16MB/1.0GB	\$3499
Pentium 120	11.3" Active SVGA	16MB/2.1GB	3999
Pentium 133	12.1" Active SVGA	24MB/1.0GB	4499
Pentium 133	12.1" Active SVGA	24MB/2.1GB	4999

Ascentia P

AST Ascentia J

- Integrated 1+4 14.4 data fax modem and audio on selected models
- PCI bus architecture with 256KB Level 2 cache (16MB on P100, 11.3")
- 10.4" & 11.3" SVGA (800x600) resolution Dual Scan and Active Matrix displays

Processor	Display	RAM	Price
Pentium 75	10.4" Dual Scan SVGA	8/500MB	\$1849
Pentium 100	11.3" Dual Scan SVGA	8/810MB	1999
Pentium 75	10.4" Dual Scan SVGA	8/800MB	2049
Pentium 100	10.4" Dual Scan SVGA	8/800MB	2199
Pentium 100	10.4" Active Matrix SVGA	8/800MB	2499
Pentium 133	10.4" Active Matrix SVGA	8/800MB	2899



Ascentia J

AST AST logo are trademarks of
AST Research Inc. All rights reserved

digital

Digital HiNote VP

Processor	Display	RAM	Price
Pentium 100	11.3" Dual Scan SVGA	8/810MB	\$1999
Pentium 120	11.3" Dual Scan SVGA	8MB/1GB	2269
Pentium 120	11.3" Active SVGA	8MB/1GB	2779

All configurations are available with Windows 95 or Windows NT

Call for Special
**\$1899 Price on
120MHz HiNote VP**

Digital HiNote VP

Digital HiNote Ultra II

- Up to 150MHz Pentium processors
- Only 1.2" thick and 4.0 lbs.
- 11.3" Super VGA, Active Matrix displays
- 16MB of RAM memory

Processor	Display	RAM	Price
Pentium 133	11.3" Active SVGA	16MB/1.35GB	\$4499
Pentium 133	11.3" Active SVGA	16MB/1.35GB	4499*
Pentium 133	11.3" Active SVGA	16MB/1.35GB	4699†
Pentium 150	11.3" Active SVGA	16MB/1.44GB	4799
Pentium 150	11.3" Active SVGA	16MB/1.44GB	4799*
Pentium 150	11.3" Active SVGA	16MB/1.44GB	4999†

Digital
Ultra II
with
external
floppy dock

* Features Windows for Workgroups
† Features Windows NT

SHARP

Now Sharp "Addressing Dual Scan Technology" virtually eliminates any ghosting or shadowing of images on screen display.

Get a 50% brighter display with 38% less power usage than conventional Active Matrix screens with Sharp "SHA" screen technology. Available on select Sharp models.

Sharp PC-3000/9000

- GlidePoint™ pointer—the latest technology, the easiest to use
- Built-in 4X or 6X CD-ROM drives on selected models
- 32-bit PCI Local bus graphics
- Built-in SoundBlaster compatible sound, microphone and speakers on selected models

Processor	Display	RAM	Price
Pentium 100	11.3" Dual Scan SVGA	8/515MB	\$1949
Pentium 100	11.3" Dual Scan SVGA	16MB/1GB	2249Δ
Pentium 100	11.3" Dual Scan SVGA	8MB/1GB	2449†Δ

Processor	Display	RAM	Price
Pentium 100	12.1" Dual Scan	8MB/1.1GB	\$2199Δ
Pentium 120	12.1" Dual Scan	16MB/1.1GB	2999†Δ
Pentium 133	11.3" Active SVGA (SHA)	16MB/1.1GB	3999†Δ
Pentium 133	12.1" Active SVGA (SHA)	16MB/1GB	4299*Δ
Pentium 133	12.1" Active SVGA	16MB/1.3GB	4999†Δ

* Includes built-in 4X CD-ROM drive
† Includes built-in 6X CD-ROM drive
Δ Includes built-in SoundBlaster compatible sound, microphone and speakers

Sharp PC Series

hp HEWLETT®
PACKARD

HP OmniBook 800

- Up to 133MHz Pentium processors
- Instant On with up to 4 month standby life
- Only 3.75 lbs.
- Optional docking system available

Processor	Display	RAM	Price
Pentium 100	10" Dual Scan SVGA	16/810MB	\$3329
Pentium 133	10.4" Active SVGA	16MB/1.4GB	4759

HP OmniBook 5500

- Up to 133MHz Pentium with 32 bit PCI local bus
- Super VGA-800 x 600 resolution on notebook
- PCI Local bus video 1MB video memory
- 16-bit stereo sound with 2 speakers
- Optional 4X CD-ROM available

Processor	Display	RAM	Price
Pentium 120	11.3" Dual Scan SVGA	16MB/1.35GB	\$4259
Pentium 120	10.4" Active SVGA	16MB/1.35GB	4489
Pentium 120	12.1" Active SVGA	16MB/1.35GB	5259
Pentium 133	12.1" Active SVGA	16MB/1.35GB	5579
Pentium 133	12.1" Active SVGA	16MB/2GB	5999

UP TO
133MHz
Pentium
with PCI BUS



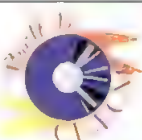
HP OmniBook 5500 Notebook PC

olivetti
personal computers

Olivetti Echos

- Up to 133MHz Pentium processors
- Built-in 6X CD-ROM drives
- Giant 1.3GB removable hard drives
- Up to 11.8" Super VGA displays
- 16-bit stereo audio, speakers and microphone
- Optional docking station available

Processor	Display	RAM	Price
Pentium 100	11.3" Dual Scan SVGA	8MB/1.3GB	\$2299
Pentium 100	10.4" Active SVGA	8MB/1.3GB	2799
Pentium 120	11.3" Active SVGA	8MB/1.3GB	3599
Pentium 133	11.8" Active SVGA	16MB/1.3GB	4599



UP TO
133MHz
Pentium



Olivetti Echos Series
Notebook

Prices
starting at
\$2299

More Brand Names, Peripherals and Software
available. If you don't see it, CALL!

International: 508-624-6400
Email: sales@pcsmpleat.com
Visit us at www.pcsmpleat.com

Open 7am-Midnight weekdays, 8am-8pm weekends and holidays.

800-341-4606

CIRCLE 288 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

PCs COMPLEAT

A COMPUSA® COMPANY
800-341-4606

Call for
Guaranteed
Lowest
Price
on
Systems*

Call for a
FREE
PRODUCT
GUIDE

COMPLEAT

✓ **Guaranteed 2nd Day Delivery** ✓ **30-Day Money Back Guarantee**

IBM®

IBM Aptiva

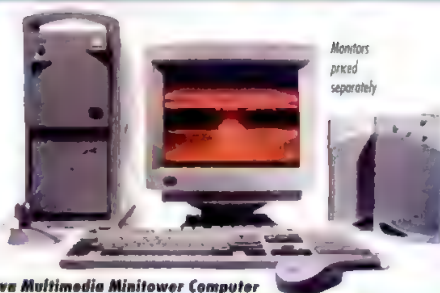
- Up to 200MHz Pentium processors
- 8X CD-ROM drive
- 28.8 data fax voice modem with telephony
- MPEG support with full motion video
- 16-bit WaveTable 3-D Surround Sound
- Comes with over 40 software titles

Processor	RAM/HD	CD-ROM	Price
Pentium 120	16MB/1.6GB	8X	\$1969
Pentium 133	16MB/1.6GB	8X	1999
Pentium 166	16MB/2.0GB	8X	2449
Pentium 200	16MB/2.5GB	8X	2899
Pentium 200	32MB/3.2GB	8X	3299

Monitors priced separately

**UP TO 200 MHz
PENTIUM**

IBM Aptiva Multimedia Minutower Computer



Monitors
priced
separately



**FULL-MOTION
VIDEO**

AST®

Authorized Reseller

**UP TO 200 MHz
PENTIUM**

AST, AST logo are trademarks of
AST Research, Inc. All rights reserved



Advantage Multimedia

Monitors priced separately
Product differs slightly from photo

Advantage Adventure Multimedia

- Up to 200MHz Pentium processors
- 8X CD-ROM drive
- MPEG Level 4 playback support
- 33.6 data fax voice modem on selected models
- Integrated 3-D surround sound
- Video conferencing & tuner card on 9312 model

Processor	RAM/HD	CD-ROM	Price
Pentium 133	24MB/1.6GB	8X	\$1699*
Pentium 166	24MB/2.5GB	8X	2199*
Pentium 166	24MB/2.5GB	8X	2499*
Pentium 166	24MB/2.5GB	8X	2599†
Pentium 166	32MB/2.5GB	8X	2799*
Pentium 200	24MB/4.0GB	8X	2799
Pentium 200	32MB/3.0GB	8X	2999

* Features a 33.6 data/fax/voice modem
† 9312 model

Monitors priced separately

NEC

**ALL NEW
MODELS**



NEC Ready Multimedia
Product differs slightly from photo

Ready Multimedia

- Up to 200MHz Pentium processors
- 8X CD-ROM drive and audio wavetable
- 33.6 data fax modem
- 256KB cache memory
- Up to 4MB standard video memory
- Tons of FREE software
- Up to 3.2GB hard drives

Processor	RAM/HD	CD-ROM	Price
Pentium 120	16MB/1.6GB	8X	\$1599
Pentium 133	16MB/2.0GB	8X	1999
Pentium 166	32MB/2.5GB	8X	2199
Pentium 166	32MB/3.2GB	8X	2699
Pentium 200	32MB/3.2GB	8X	2999

Monitors priced separately

**Additional models available.
Call for details.**

TOSHIBA

**UP TO 200 MHz
PENTIUM**

Toshiba Multimedia

- Up to 200MHz Pentium processors
- 8X CD-ROM drive
- 28.8 full duplex data/fax modem
- 2MB EDO video RAM
- Tons of FREE software

Processor	RAM/HD	CD-ROM	Price
Pentium 133	16MB/1.6GB	8X	\$1799
Pentium 166	16MB/2.1GB	8X	2099
Pentium 200	16MB/3.0GB	8X	2799

Monitors priced separately



Toshiba Multimedia Monitors priced separately

**HOT NEW
PRODUCTS!**

COMPAQ

**UP TO
166MHz**



Presario Multimedia

- 6X CD-ROM drive
- 3D surround sound with JBL Pro speakers
- Tons of FREE educational and business software
- 33.6 data fax modem
- Up to 2.5GB hard drives

Processor	RAM/HD	CD-ROM	Price
Pentium 133	16MB/1.6GB	6X	\$1699
Pentium 166	24MB/2.5GB	6X	2199

Monitors priced separately

**HOT
PRODUCT**

Monitors priced
separately



Compaq Presario Multimedia

PCM 10/96

ONLY at PCs COMPLEAT ✓ **Lowest Price Guarantee** ✓ **30-Day Money Back Guarantee** ✓ **Free Tech Support** ✓ **Free Software Installation** ✓ **Free Configuration**

SERVICE

5 YEAR
5 YEAR
SERVICE PLANS

AVAILABLE ON ALL
COMPUTER SYSTEMS

REPLACEMENT
SERVICE PLAN

AVAILABLE ON MOST PERIPHERALS
CALL TODAY FOR DETAILS & PRICING!

PCs
COMPLEAT

A COMPUSA® COMPANY

800-341-4606

✓ Free Software Installation ✓ Free Tech Support ✓ Free Configuration

Sizzling Savings

Save BIG with Some of the Lowest Prices You'll Find!

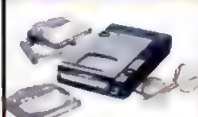
We Carry Over
30,000
Products!
Call Today!

Great Buy on
Exabyte External
1.6/3.2
Travan Tape Backup

#315745000

Incredibly
LOW
\$159⁰⁰

While
Supplies
Last!



Iomega
Jaz Drive
#10133

\$399⁹⁵



MicroSolutions Travan
External 800T, 800MB
Tape Backup
#143010

\$139⁰⁰



Iomega
Zip Drive
#1001210MEGA

\$199⁹⁵



Creative Labs Blaster 8X
Multimedia Upgrade Kit
#5018601003

\$189⁰⁰



Maxtor 2GB
Enhanced IDE Hard Drive

#K0872000A

Limit two per customer

Before
\$299⁹⁹
REBATE
\$50

After
\$249⁹⁹
Expires 11/15/96

4MB SIMM
as low as
\$39.00



PCs Compleat 4MB
Memory Upgrade
2X32, 72pin non-parity

\$39⁰⁰

#322-0060

VisionTek 8MB
Memory Upgrade
2X32, 72pin non-parity

\$69⁰⁰

#15115.0

PCs Compleat 16MB
Memory Upgrade
4X32, 72pin non-parity

\$149⁰⁰

#322-0002

VisionTek 8MB
Memory Upgrade
2X36, 72pin parity

\$89⁰⁰

#15150.0



Creative Labs
SoundBlaster 32PnP
#2036001171

\$159⁰⁰



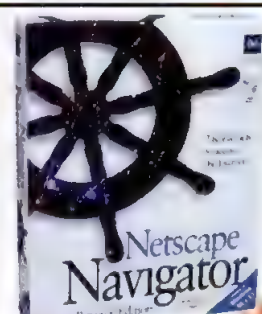
Syquest EZ135 MB
Removable Ext
#5982136-001

\$119⁹⁵



Diamond 4X
CD-ROM Kit
with IDE Card
#KITMM-K500

ONLY
\$49⁰⁰



Netscape
Navigator 3.0
Personal Edition
Win 95 & Win-CD
#102-03746-00

ONLY
\$39⁹⁹



SYMANTEC
pcANYWHERE 2.0/Win
#07-00-01326

\$129⁹⁹



SYMANTEC
ACT 2.0/Win
#06-00-00343

\$179⁹⁹



Norton Anti-Virus, Win95
#07-00-01850

\$24⁹⁹*

*After \$48 Rebate. Offer expires 60 days after purchase.



Microsoft
FrontPage 1.1/Win95
#392-00003

\$99⁹⁹*

*After Rebate. Ends 3/97



CyberMedia
First Aid Deluxe-CD, Win 95
#1026

\$53⁹⁹



COREL WordPerfect Suite
6.1 Upgrade-CD
#CWWP561-UG-ENG0

\$99⁹⁹



Intuit
QuickBooks Pro 4.0 Win
#73300

\$189⁹⁹

Prices and rebate offers valid while supplies last. Limited Time Offer.

More Brand Names, Peripherals and Software
available. If you don't see it, CALL!

International: 508-624-6400
Email: sales@pcscmpleat.com
Visit us at www.pcscmpleat.com
Open 7am-11pm weekdays, 9am-5pm weekends and holidays.

800-341-4606

CIRCLE 092 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)


```
*****
* Open the Form in Design mode, select the View menu and
* choose Code, then choose Insert Procedure and add the
* code below
*****
```

```
Public Sub SetFormForCountry()
Select Case Me!Country
Case "USA"
    Me!PostalCode.InputMask = "00000\ -9999;0;_"
    Me!PostalCodeLabel.Caption = "Zip Code:"
Case "Canada"
    Me!PostalCode.InputMask = ">?9? \ 9?9;0;_"
    Me!PostalCodeLabel.Caption = "Postal Code:"
Case Else
    Me!PostalCode.InputMask = Null
    Me!PostalCodeLabel.Caption = "Postal Code:"
End Select
```

```
End Sub
```

```
*****
* Place the following in the Form's On Load event.
*****
```

```
Private Sub Form_Load()
Call SetFormForCountry
End Sub
```

```
*****
* Place the following in the Country control's After
* Update event
*****
```

```
Private Sub Country_AfterUpdate()
Call SetFormForCountry
End Sub
```



FIGURE 3: The code shown here will customize the form's PostalCode input masks based on the value in the Country field. You can alter the code to add support for additional countries or to alter phone-number input masks as well.

accomplishes these tasks.

Because the code needs to be called from more than one place, I created a separate SetFormForCountry procedure to customize the mask settings. This code contains a Select Case structure with a Case section for each country. You could then add additional countries to this code. You could also add code to customize the phone-number fields based on the value in the Country field, if you like.

Note that the default input mask is Null, meaning no mask is performed, and the default label is "Postal Code."

The code must be called when the form first loads and thereafter whenever the Country field is updated. Therefore, calls to SetFormForCountry are placed in the Form's On Load event (the second procedure in Figure 3) and the Country control's After Update event (the third procedure in Figure 3).

This approach makes it easier to add support for additional countries and makes the customization of input masks more automatic.

The code in Figure 3 was written for Microsoft Access for Windows 95. For Access 2.0, just remove the Public and Private keywords before each Sub.

Readers interested in the data-quality issues surrounding good address hygiene might appreciate Toby Atkinson's "Address Hygiene for Global Databases" in the April 1996 issue of *Database Programming & Design*.—Sal Ricciardi

Date Format Problem

The IsLeap function published in your issue of April 23, 1996, will not work if the SET DATE setting is not AMERICAN, USA, or MDY. If you choose a different date format, the function will return .F., because the CTOD() function will then expect its parameters in a format different from month/day/year, and the function as written always passes "02/29" in month/day/year

format. Also, unless you explicitly set the default date format in your code, FoxPro defaults to the date format chosen in the Windows Control Panel (International in Windows 3.1 or Regional Settings in Windows 95). This means a user can potentially "break" the code by changing the Control Panel setting outside your application.

I recommend saving and restoring the SET DATE setting like this:

```
FUNCTION IsLeap
PARAMETER dDate
PRIVATE retval, dform
dform=SET("DATE")
SET DATE AMERICAN
retval=!EMPTY(CTOD("02/29"+
->STR(YEAR(dDATE))))
SET DATE (dform)
RETURN retval
```

in order to avoid problems.

BOB VELKE
Elk Ridge, Maryland

PC MAGAZINE: This is a good solution if there's any chance your application may end up running under an international date setting. The FoxPro for Windows and Visual FoxPro functions, such as CTOD() and DTOC(), that accept date-format parameters expect the parameter to be in the current date format. If you're in the U.S., that's usually the AMERICAN format, although you can change the date format in several ways, should the need arise. First, you can change it through the Windows Control Panel. In this case, FoxPro for Windows will adopt your new setting by default when it starts up. Visual FoxPro will, too, if you choose Use System Options in the Tools | Options dialog. You can also change the date setting temporarily in FoxPro for Windows through the View Window or in Visual FoxPro, by making selections in the Tools

| Options dialog. In Visual FoxPro, you can click Set as Default before you close the Options dialog to make your setting persist beyond the current session. (The settings are stored in the Registry.)

The best way to guard your application against curious users making external changes to Control Panel settings is to take control of these settings in your code. For example, you can embed statements in your code that save, set, and restore environment settings like SET DATE, SET CURRENCY, and so on. Placing a SET DATE AMERICAN statement early on in your code ensures the proper date format regardless of the Control Panel setting.

If, on the other hand, you want your application to work with international settings or adopt the Control Panel settings, then you have to adopt techniques, such as Mr. Velke's, to ensure that functions accepting date parameters receive them as expected—that is, in the expected format.—Sal Ricciardi □

HOW TO CONTACT US

Send your tips and questions to our advisors in any of the following ways:

INTERNET MAIL
pctech@zd.com

FAX 212-503-5799

U.S. MAIL Solutions, PC Magazine,
One Park Ave., New York, NY
10016-5802 (Please send a floppy
disk and a printout.)



If we print your tip, you'll receive \$50 plus a PC Magazine T-shirt. We regret that we cannot answer letters individually.



YOUR MEMORY CENTER!

THE LOWEST PRICING IN THE INDUSTRY

CALL TODAY FOR OUR FREE CATALOG! Great Selection of hardware and software.

Featuring

SOUTHLAND

M I C R O S Y S T E M S

Quality • Strength • Speed

- All Products Backed By A Lifetime Warranty • Highly Competitive Pricing • Modules Are 100% Tested Prior To Shipment • Most Stringent Quality Control In The Industry • Consistently First To Market With New Products
- Built To Original Equipment Manufacturer (OEM) Specifications

SIMM MEMORY

FREE FedEx Shipping

1MB x 32 60NS SIMMS	33
1MB x 32 70NS SIMMS	35
1MB x 32 80NS EDO SIMMS	36
1MB x 32 90NS EDO SIMMS	38
2MB x 32 60NS SIMMS	70
2MB x 32 70NS SIMMS	72
2MB x 32 80NS EDO SIMMS	74
2MB x 32 90NS EDO SIMMS	76
4MB x 32 60NS SIMMS	139
4MB x 32 70NS SIMMS	141
4MB x 32 80NS EDO SIMMS	143
4MB x 32 90NS EDO SIMMS	145
8MB x 32 60NS SIMMS	225
8MB x 32 70NS SIMMS	227
8MB x 32 80NS EDO SIMMS	229
8MB x 32 90NS EDO SIMMS	231
1MB x 36 60NS SIMMS	47
1MB x 36 70NS SIMMS	49
1MB x 36 80NS SIMMS	51
2MB x 36 60NS SIMMS	81
2MB x 36 70NS SIMMS	83
2MB x 36 80NS SIMMS	85
2MB x 36 90NS SIMMS	87
4MB x 36 60NS SIMMS	134
4MB x 36 70NS SIMMS	136
4MB x 36 80NS SIMMS	138
4MB x 36 90NS SIMMS	140
8MB x 36 60NS SIMMS	229
8MB x 36 70NS SIMMS	231
8MB x 36 80NS SIMMS	233
8MB x 36 90NS SIMMS	235
1MB x 9 60NS SIMMS	26
1MB x 9 70NS SIMMS	28
1MB x 9 80NS SIMMS	30
1MB x 9 90NS SIMMS	32

DESKTOP MEMORY

FREE FedEx Shipping!

AST

Bravo LC Series, Mini-Towers, 4MB	39
Bravo LC Series, Mini-Towers, 8MB	51
Bravo LC Series, Mini-Towers, 16MB	118
Premiera LX Series, Desktops, 8MB	51
Premiera LX Series, Desktops, 16MB	116
Premiera LX Series, Desktops, 32MB	236

COMPAQ

Deskpro Prolinea P75-90, 8MB	58
Deskpro Prolinea P75-90, 16MB	118
Deskpro Prolinea P75-90, 32MB	228
Deskpro XL Series, Desktops, 8MB	88
Deskpro XL Series, Desktops, 16MB	197
Deskpro XL Series, Desktops, 32MB	312
Deskpro XL Series, Desktops, 64MB	273
Deskpro XL Series, Desktops, 128MB	333
Prosignia 1500/150R/133 Servers, 16MB	190
Prosignia 1500/150R/133 Servers, 32MB	318
Prosignia Series, Desktops, 8MB	58
Prosignia Series, Desktops, 16MB	118
Prosignia Series, Desktops, 32MB	228
Prosignia Series, Servers, 8MB	88
Prosignia Series, Servers, 16MB	197
Prosignia Series, Servers, 32MB	312

HEWLETT PACKARD

Vectra VL3 Series, Desktops, 8MB	57
Vectra VL3 Series, Desktops, 16MB	120
Vectra VL3 Series, Desktops, 32MB	228
Vectra VL4 Series, Desktops, 8MB	65
Vectra VL4 Series, Desktops, 16MB	111
Vectra VL4 Series, Desktops, 32MB	388
Vectra XU/VT 6150, MT, 16MB	273
Vectra XU/VT 6150, MT, 32MB	338
Vectra Net server LC, Servers, 8MB	81
Vectra Net server LC, Servers, 16MB	148
Vectra Net server LC, Servers, 32MB	261

IBM

Active M40M41 Desktops, 8MB	80
Active M40M41 Desktops, 16MB	120
Active M40M41 Desktops, 32MB	231
PS-1 Value Point, Desktops, 4MB	43
PS-1 Value Point, Desktops, 16MB	152
PC 300/700 Desktops, MT, 8MB	95
PC 300/700 Desktops, MT, 16MB	173
PC 300/700 Desktops, MT, 32MB	267
PC Server 310 Series, Servers, 8MB	33
PC Server 310 Series, Servers, 16MB	156
PC Server 310 Series, Servers, 32MB	287

NEC

Powermate P120, Desktops, 8MB	87
Powermate P120, Desktops, 16MB	126
Powermate P120, Desktops, 32MB	370

NOTEBOOK MEMORY

FREE FedEx Shipping!

AST

Ascenta J Series, 8MB/16MB/32MB	70/152/246
Ascenta P Series, 8MB	100
Ascenta 800N Series, 4MB/8MB	90/108
Ascenta 800N Series, 15MB	129
Ascenta 900N Series, 4MB/8MB	78/87
Ascenta 900N Series, 16MB	167
Ascenta LX Series, 8MB/16MB	85/252

COMPAQ

Armada 1120, 1120T, 8MB/16MB	79/148
Armada 4100 Series, 8MB/16MB	CALL
Armada 4100 Series, 32MB	168
LTE 5000 Series, 32 MB	77/145
LTE Elite Series, 4MB/8MB	263
Contura 400CX Series, 4MB/8MB	47/98
Contura 400CX Series, 16MB	70/93
Contura 486 Series, 4MB/8MB/16MB	46/96/230
Concerto Series, 4MB/8MB	85/136

HEWLETT PACKARD

HP Omnibook 300, 425, 433, 4MB	121
HP Omnibook 330, 600, 4MB/8MB	118/200
HP Omnibook 4000 Series, 4MB	84
HP Omnibook 4000 Series, 16MB	141

IBM

Thinkpad 365C Series, 4MB/16MB	381/162
Thinkpad 701C Series, 4MB/8MB	41/92
Thinkpad 701C Series, 16MB	187
Thinkpad 750 Series, 16MB/32MB	180/534
Thinkpad 755 Series, 8MB/16MB	92/160
Thinkpad 755 Series, 32MB	534
Thinkpad 750 Series, 8MB/16MB	121/195
Thinkpad 780E, 365X, 560, 8MB/16MB	92/195
Thinkpad 780E, 365X, 560, 32MB	1248

NEC

Versa S Series, 4MB/8MB/16MB	35/76/148
Versa 600H, 600XH, X, 8MB/16MB	CALL

TEXAS INSTRUMENTS

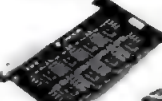
Extensa Series, 8MB/16MB/32MB	71/101/293
-------------------------------	------------

TOSHIBA

T2100 Series, 8MB/16MB	58/147
T400 410 Series, 8MB/16MB	88/156
T400 410 Series, 32MB	291
Satellite Pro 4200CS, 4200CT, 8MB	75
Satellite Pro 4200CS, 4200CT, 16MB	135
Satellite Pro 4200CS, 4200CT, 32MB	CALL
T610 Series, 8MB/16MB	88/150
T610 Series, 32MB	291
Portege 6500CT, 8MB/16MB	75/118
Portege 6500CT, 32MB/64MB	CALL
Tetra T700 Series, 8MB/16MB	97/265
Tetra T700 Series, 32MB	760
Tetra T720 Series, 16MB/32MB	156/291
Tetra 500CS, 5000CT, 16MB/32MB	134/292
Tetra 500CS, 5000CT, 48MB/128MB	453/CALL
Z-notebook Series, 4MB/8MB	36/76
Z-notebook Series, 16MB	148

PRINTER MEMORY

FREE FedEx Shipping



Canon

BP 860 Laser Printer, 4MB	29
BP 860 Laser Printer, 16MB	116
BP 860 Laser Printer, 32MB	236

COMPAQ

PageMark 15, 20 LED Printer, 4MB	80
PageMark 15, 20 LED Printer, 8MB	142
PageMark 15, 20 LED Printer, 16MB	294

HEWLETT PACKARD

LaserJet 4, 4SL, DJ1200, 1MB	28
LaserJet 4, 4SL, DJ1200, 2MB	56
LaserJet 4, DJ1200, DJ600, 4MB	68
LaserJet 4, DJ1200, DJ600, 8MB	98
LaserJet 4, DJ1200, DJ600, 16MB	122
LaserJet 4, DJ1200, DJ600, 32MB	341
LaserJet 4P, 4+, 4V, DJ650C, 4MB	30
LaserJet 4P, 4+, 4V, DJ650C, 8MB	61
LaserJet 4SL, 4SLMX, 4MB	58
LaserJet 4SL, 4SLMX, 8MB	98
LaserJet 5L Laser Printer, 4MB	107
LaserJet 5L Laser Printer, 8MB	91
LaserJet 5S/5SXX, 2MB	27
LaserJet 5S/5SXX, 4MB	30
LaserJet 5S/5SXX, 8MB	61
LaserJet 5S/5SXX, 16MB	116

LEXMARK

BM Lexmark 4000, 4007, 4007, 2MB	32
BM Lexmark 4000, 4007, 4007, 4MB	64
BM Lexmark 4000, 4007, 4007, 8MB	61
BM Lexmark 4000, 4007, 4007, 16MB	61

OKIDATA

OL400 Laser Printer, 2MB	88
OL800 820 Laser Printers, 4MB	151

Panasonic

KX 4410, 4430 Dot Matrix Printers, 4MB	139
KX 4440, 5417 Dot Matrix Printers, 4MB	88
KX 4455 Dot Matrix Printers, 2MB	133

OVERNIGHT SHIPPING

FedEx FREE

As low as \$9.00 Per Megabyte

Free per MB based on 8MBX32-70NS 32MB 5MB

FedEx

DHL

NO HIDDEN SURCHARGES!!

VISIT US ON THE WEB

http://www.mcworks.com

KEY CODE MPB10/6



600 Bunker Court
Vernon Hills, IL 60061

- ✓ Overnight Shipping
- ✓ COD's Welcome
- ✓ Technical Support
- ✓ P.O.'s Accepted

Restrictions may apply.

800-770-4340

FAX 1-847-367-8540
Customer Service 1-847-367-7583

TOLL-FREE CST 8AM-7PM

PC MAG OCT. '98

Bulldog Computer
Products received
PC COMPUTING's
★★★★
mail order award!

**Toshiba has packed
plenty of power into the
Satellite series.**

Satellite 110CS/CT.....1929/2419
• Intel 100MHz Pentium chip
• 11.3" DS or active @ 800x600
• 810MB drive
Portege 610CT.....CALL
Portege 650CT.....CALL
• Pentium® 133MHz chip

AST ASCENTIA

J-Pentium 100 800-Active.....2799
J-Pentium 133 800-Active.....3279
P-100 800 or 1.2.....3049/3299
P40 CTS11 1.0 or 2.1GB.....3279/3739
CTS12 1.0 or 2.1GB.....4199/4649

MONITORS

NANAO F2 17 / 17EX.....839/939
NANAO FX2-21 / T2-17TS.....2869/1039
NANAO T2-17 / 20.....1059/1819
NEC C400 / C500.....289/379
NEC XE21 / XP21.....1659/1939
NOKIA 449E / 447X.....439/919
NOKIA 447L / 445X.....669/1859

PRINCETON

Ultra EO 40 / EO 50.....229/319
EO17/70/75.....559/519/659
Ultra 40/50.....219/279
Ultra 70F or 17+.....489/569
Ultra 20 - 1600 x 1280.....1039

VIEWSONIC

17EA / 15GS / 15GA.....609/379/439
17GS / 17GA / 17PS.....609/679/719
GT770 / 800.....819/1529
PT770 / PT810.....779/1599
P810 / P815.....1659/1859



The **DX15T** and **DX17T** feature advanced Trinitron CRTs for brilliant colors and vibrant images. Advanced Trinitron CRTs on both models renders a vertically flat display surface to reduce distortion and enhance image quality corner to corner. Features include ultra high resolutions up to 1280 x 1024 non-interlaced. A superfine .25mm pitch ensures extremely sharp focus and definition which traditional CRTs cannot match.

DX15T...369 **DX17T**.....639



1-800-438-6039

**TOSHIBA
SPECIALIST!**



TOSHIBA

Tecra 500CS/CDT...BEST PRICE

- Select bay with swappable FDD, 6X CD-ROM, 2nd HDD
- 12.1" DS or Active 800x600
- 1.3GB drive

The next revolution in computing is here!

Tecra 730 CDT.....CALL
Intel's Pentium® 150MHz processor!!!

- 2.1GB drive
- 12.1" display
- true PCI bus
- 6X CD-ROM

Tecra 720 CDT.....CALL
• 133MHz processor

**NEW!
GREAT
PRICE**

NETWORK

3 Com

3C509-Ether III / 5-pack.....99/349
3C509-Ether III 20/60-pack..1299/4199
3C590 / 5-pack.....109/549
3C900 PCI / 1 or 5-pack.....109/509
3C900 Ether XL 20-pack.....1799
3C589 or combo.....149/199
3C562 PCMCIA Ether/28.8 modem..399

ARTISOFT

Starter Kit 7.0.....249
Lantastic 10 / unlimited-user..339/659

INTEL

Ether Express Pro / 5-pack.....89/319
Ether Pro TP 20-pack.....1149
Ether Pro Flash 5 / 20 pack..369/1289
Ether 10/100 PCI TX.....119
Ether 10/100 Mbps PCI 5-pack.....529
Netport EL / XL.....359/399
Netport Pro Int/Ext.....249/339

NOVELL

NetWare 3.12 5 / 10-user.....619/1299
NetWare 3.12 25 / 50-user..1799/2299
NetWare 3.12 100-user.....3399
NetWare 3.12 250-user.....4299
NetWare 4.1 5 / 10-user.....589/1299
NetWare 4.1 25/50-user.....1799/2299

SCANNERS/DIGITIZERS

Epson Action Scanning II.....389
Epson ES1000C or ES1200C..559/1059
Logitech PageScan.....309
Microtek E3 / E6.....349/529
Microtek ScanMaker III.....1859
Minolta Quik Scan 35.....979
Polaroid Sprint Scan 35LE.....729
Relisys Scorpio / Taurus.....339/499
Summasketch 12 x 12.....229
Summasketch 12 x 18.....459
UMAX S6E/S12 Pro.....399/789
UMAX PowerLook II.....1449
Visioneer Paper VX.....259

CHIPS

4/8/16 mg Simms.....49/79/129
HP 4mg / 8mg.....69/99
Cyrus DRX2 or SRX2.....179
Toshiba EDO 8/16MB.....129/199
Toshiba EDO 32MB.....379

intel OVERDRIVE

DX4-75MHz/100MHz.....135/169
Pentium® chip 63 or 83MHz.....139/179
Pentium® chip 120/125MHz.....259
Pentium® chip 150 or 166MHz...319/439

MODEMS AND FAX

MEGAHERTZ—14.4 / 28.8.....139/239
28.8 Ethernet / Modem card.....279

HAYES

PCMCIA 14.4 / 28.8.....149/209
Accura 14.4 Fax Int / Ext.....79/89
Accura 28.8 V.34 Int / Ext.....149/159

PRICE DROP - WITH VOICE!!!

Optima 28.8 Int / Ext.....209/219

PRACTICAL PERIPHERALS

PP 14400 Fax Int / Ext.....69/79
28.8 Int / Ext V.34.....139/149

US ROBOTICS

Sportster 28.8 WIN Int.....109
Sportster 28.8 V.34 Int / Ext.....139/159
Sportster 28.8 Vi Int/Ext.....155/165
V.34 Courier Fax Int / Ext.....229/269
Sportster PCMCIA 28.8 Data.....229

DIGITAL CAMERAS

CHINON ESC-3000.....819
EPSON Photo PC Camera.....LOW
Kodak Digital DC20/40/50..329/589/969



Experience the new standard in CD-ROM computing! Driven by a 100MHz Pentium® processor, Toshiba's Satellite Pro 420 series offers a modular six-speed CD-ROM.

Satellite Pro 420CDS.....2419

**100MHz
Pentium® chip**

- 11.3" dual scan color
- 810 MB • 8MB EDO RAM
- optional 6X CD-ROM

Satellite Pro 420CDT.....CALL

- 100MHz Pentium® chip
- 6X CD-ROM • active color
- 8MB EDO RAM
- 1.26GB drive

PRINTERS



Stylus.COLOR 500*.....279

LX300.....169 **LQ 1070+**.....379
FX870.....279 **LQ1170**.....669
FX1170.....369 **LQ2170**.....CALL
FX 2170.....CALL **LQ2550**.....959
LQ570.....249 **DFX5000**.....1389
LQ870.....429 **DFX8000**.....2299
Stylus 1000/1500.....459/BEST PRICE
Stylus Pro/XL.....BEST PRICE/CALL

Canon

BCJ30/70/210.....259/289/149
BCJ230/240/4100.....379/179/229
BJC620/4200/4550.....399/299/CALL
MultiPass 800/2500C.....489/589

HEWLETT-PACKARD

Laserjet IV+ or IVM+.....1099/1549
Laserjet 5 or 5M.....1279/1799
Laserjet IVL / VL.....469/519
Laserjet VP / VMP.....859/1039
Laserjet IV V / MV.....1989/2799
HP 5SI / MX.....2819/3899
DeskJet 680c / 1800.....289/1399
DeskJet 820CXI / 870CXI.....379/489
OfficeJet 300 / 330.....529/569
Upgrade HP 2mb/4mb/8mb..49/59/89

OKIDATA

ML380 / 320 / 321.....219/319/429
ML520 / 521.....379/499
ML590 / 591.....429/589
395 / OL1200 / 3410.....979/979/1249
Laser 600E / 810E.....399/699
Laser 610E / PS.....479/699

TAPE AND MISC.

TELEVIDEO

Family Value 4X CD, sound card, speakers, CD titles.....179

SEAGATE

1.2 / 1.6GB.....199/219
2.0GB / 4.0GB / 9.0GB..289/CALL/CALL

AMERICAN POWER

Back-UPS 400/450/600...149/169/239
Pro 1000 / 1400.....379/469
Pro 420 / 650.....219/269
Smart-UPS 700 / 1000.....339/449
Smart-UPS 1400 / 2200.....559/999

NO SURCHARGE FOR CREDIT CARDS!



1-800-438-6039

Open weekdays: 8:30am to 8:30pm
Saturday: 9:00am to 5:00pm
(847) 541-2394 • Fax (847) 541-6988
Shipping (847) 541-2394

\$1,159*

CD-ROM, Backup, and Writeable Floppy

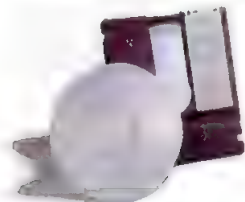
\$599*

CD-ROM, Backup, and Writeable Floppy



*Price comparison based on MSRP's as of 8/15/96.

Their Solutions. Micro Solutions.



Play CD-ROM programs, audio CDs, or use a PD cartridge for additional on-line storage.



Pack your files and tote them from PC to PC. Plugs into any IBM-compatible notebook or desktop.

Sure, you need to add function to your computer, but you don't need all those machines cluttering up your desk. The backpack pd/cd is a 3-in-1 mass storage solution that gives you a CD player and a removable cartridge storage drive. Backs up your hard drive, too.

Now, just in case you're not up on PDs (optical Phase Disks), they're a new kind of media you can read, write on, erase and remove an unlimited number of times. PDs look a lot like CDs, cost less than magnetic cartridges, and can store 650MB. Also, they can't be accidentally erased by magnetic fields.

Another good thing is the easy installation. Plug the backpack pd/cd into your printer port and your printer into the backpack. That's it. Save your precious few expansion slots for something else.

And best of all, the backpack pd/cd is half the price of those other solutions!



Standard 650MB optical disks can be erased. Use over and over.



backpack
pd/cd

MicroSolutions
The port•ability leader.

Ph: 800-293-1214 (US and Canada)
or 815-756-3411, Fax: 815-756-2928
Internet: www.micro-solutions.com

Available through computer dealers, computer superstores, and mail order catalogs.

Seagate Software is a trademark of Seagate Technology, Inc.

CDW - 800 736 4239 • Global Computer Supplies - 800 845 6225 • Inmac - 800 547 5444 • Micro Warehouse - 800 367 7080 • Midwest Micro - 800 413 9856
PC Connection, Inc. - 800 800 5555 • PCs Compiled, Inc. - 800 514 4727 • PC Zone - 800 258 2088 • Quill - 800 789 0605 • USA Flex - 800 872 3539

CIRCLE 856 ON READER SERVICE CARD

7 secrets you need to know about your data

All new for
Windows 95
& NT 3.51!

1 You need the big picture to make good decisions.

With SPSS' statistical charts, you can better understand your data. In this boxplot, you see the average, minimum, maximum and distribution all at the same time.

2 You need to know when there's a problem with your data. SPSS helps you spot data entry errors or unusual data points that you may want to leave out of your analysis — or look at more closely.

3 You need to look at the data more than one way. When you create a report, what you see often leads to more questions. With SPSS' revolutionary pivot feature, you can easily reorganize the table to look at your data from another angle by simply dragging an icon.

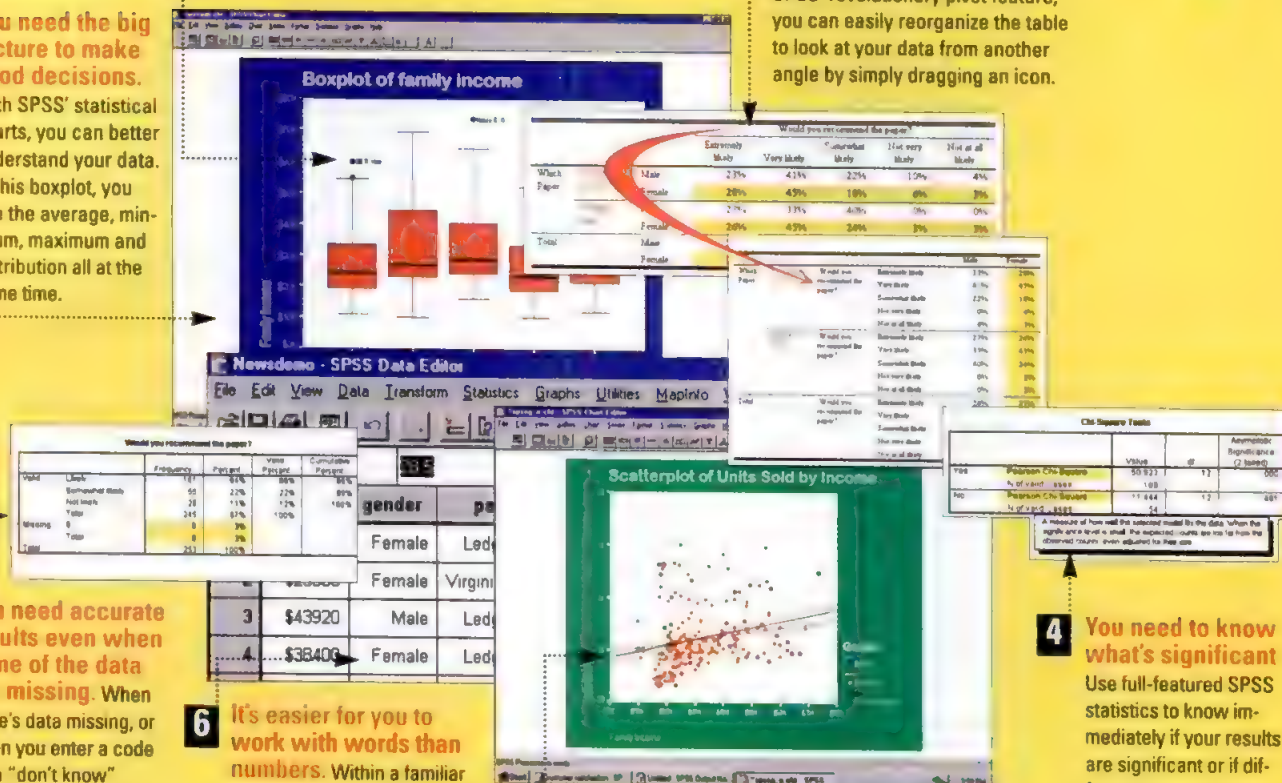
7 You need accurate results even when some of the data are missing. When there's data missing, or when you enter a code for a "don't know" answer, SPSS can adjust calculations accordingly.

6 It's easier for you to work with words than numbers. Within a familiar row-and-column setting, SPSS lets you work with words instead of confusing codes — and still do calculations. Your labels are automatically applied to your graphs and reports for clearer, faster presentations.

5 You need to separate the apples from the oranges. SPSS lets you quickly and easily run reports and graphs for different groups so you can look at them separately or compare them.

4 You need to know what's significant

Use full-featured SPSS statistics to know immediately if your results are significant or if differences are random. If your stats are rusty, click "What's This?" to get explanations, definitions and rules of thumb for statistics or results.



"It's fast, powerful, robust and a joy to use." - *Windows Sources, April 1996*

"The premiere statistical-analysis package for Windows 95."
- *PC Computing, April 1996*

"Users will want this program for extending analyses when their spreadsheets run out of steam." - *PC Magazine, April 1996*

SPSS gives you Real Stats. Real Easy. SPSS is a complete tool kit of easy-to-use statistics, graphs and reports that will help you unlock the secrets hidden in your data. Enter your data or directly import it from spreadsheets, databases or ASCII files. SPSS is used for:

- Survey research
- Quality improvement
- Marketing and sales analysis
- Research of all types

We're not saying you should give up your spreadsheet or database. But, when you're ready to go beyond simple summaries and basic row-and-column math to get the information you really need, you're ready for SPSS 7.0 for Windows.

The headquarters of SPSS Inc. is in Chicago, with over 20 offices and 60 distributors worldwide
CIRCLE 043 ON READER SERVICE CARD



Call 1 (800) 543-5833

or fax 1 (800) 841-0064

Outside the United States:
call +1 (312) 329-2400
or fax +1 (312) 329-3668

Visit our site on the World Wide Web:
<http://www.spss.com>
or e-mail:
sales@spss.com

SPSS
Real Stats. Real Easy.™

A5833

HIGH PERFORMANCE and LOW PRICE

Yes, they come together here at FOSA !!!



AP-6200

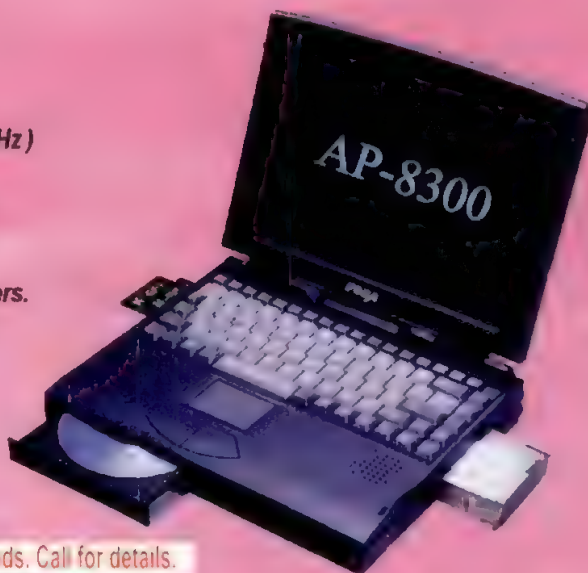
- Intel Pentium® 166 MHz CPU. (Available 75~200MHz)
- 256 KB Secondary Pipeline-Burst Synchronous Cache.
- 16MB EDO RAM. (Expandable to 72MB)
- 12.1" 800x600 Active LCD. (Dual Scan Available)
- PCI bus Graphic Accelerator w. 2MB EDO RAM.
- Built-in 6X CD-ROM Drive.
- 16 Bit Stereo Sound Card w. Built-in Mic. & Speakers..
- Removable 1.35GB HDD. (1.0 & 2.1GB Optional)
- Removable 1.44MB FDD, Second Battery Interchangeable.
- PCMCIA Slots, 3 Type II or 1 Type III & 1 Type II.
- RCA Jack for TV Output in NTSC & PAL Systems.
- Wireless IR Interface.
- Built-in Touch Pad.

for Only **\$3499**

AP-8300

- Intel Pentium® 100 MHz CPU. (Available 75~133MHz)
- 8MB EDO RAM. (Expandable to 40 MB)
- 10.4" 640x480 Active LCD. (Dual Scan Available)
- PCI bus Graphic Accelerator w. 1MB Video RAM.
- Built-in 6X CD-ROM Drive.
- 16 Bit Stereo Sound Card w. Built-in Mic. & Speakers.
- Removable 1.08GB HDD.(Optional 1.35 & 2.1 GB)
- 1 Type III & 1 Type II PCMCIA Slots.
- Built-in Touch Pad.

for Only **\$2149**



We carry other notebook models with customization for your needs. Call for details.

Friendly service

Honest warranty

Professional technical support

FOSA

the leading notebook technology

Computer Inc.

1-800-216-3672



Lifetime Toll-Free Technical Support. One year Parts and Labor Warranty. 30-Day Money Back Guarantee.





Hartford Computer Group

DELIVERING THE NEW STANDARD...

LOWEST PRICE

Call TOLL-FREE

ThinkPad 760CD IBM

- Intel Pentium® 120 MHz Processor
- Active Color, 12.1" Display
- 8mb RAM, 1mb VRAM
- 1.2gb Hard Drive
- Quad Speed CD

\$5,262.00

215



Ascentio J30 AST.

- 100MHz Pentium® Processor
- 8MB RAM std., 40MB max.
- 800MB Hard Drive
- 10.4" TFT active-matrix
- Integrated 14.4K bps data and fax modem

\$2,420.00



Other Editor's Choice Winners available from HCG...

Matrox Millennium Video Board \$249.95
USR Sportster ISDN 128K Modem \$189
IBM ThinkPad 760CD \$64
Intel EtherExpress Pro/100B

Diamond Stealth 64 Video 2201XL \$189
Hewlett Packard Deskjet 1600CM \$199
Umax PageOffice \$139
Nanao Flexscan T217TS \$139
NEC PowerMate Pro 2200

Canon BJC70 \$119
Citizen PN50 Portable Printer \$124
Xircor CC combo Ethernet 28.8
Xircor CC combo Ethernet 28.8

Motorola's Marquis Ethernet 28.8 \$659
IBM ThinkPad 760CD P/133 \$3514
AST Ascentia P50 P/133 \$159
Adaptec SlimSCSI APA1460

COMPUTERS

AST.

Bravo M5-T P100 16/1.2GB WING \$1,525
Bravo M5-T P100 16/2GB WING \$1,572
Bravo M5-T P100 16/2GB WING \$1,583
Bravo M5-T P100 16/2GB WING \$1,606
Bravo M5-T P100 16/2GB WING \$1,622
Bravo M5-T P100 16/2GB WING \$1,648
Bravo M5-T P100 16/2GB WING \$1,648
Bravo M5-T P100 16/2GB WING \$1,648
Bravo M5-T P100 16/2GB WING \$1,648

COMPAQ

2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086
2000 P100 16/1.2GB \$1,086

NEC

Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636
Powermate V2133 P133 16/1.6GB \$1,636

VIDEO DRIVES & CONTROLLERS

ADAPTEC

Single SCSI-2 ISA \$72
SCSI-2 ISA w/Floppy \$95
SCSI-2 VLB w/Floppy \$225
SCSI-2 EISA w/Floppy \$269
PCI SCSI Master \$209
Ultra PCI \$275
Kit SCSI-2 PCI \$269

Seagate

1.2GB E-IDE \$202
1.6GB E-IDE \$226
1.0GB F-ATA \$192
2.1GB F-ATA \$200

Maxtor

1.0GB E-IDE \$187
1.6GB E-IDE \$226
2.0GB E-IDE \$269

WESTERN DIGITAL

AC21000 1.02GB \$210
AC31200 1.2GB \$219
AC31800 1.8GB \$237
AC3210 2.1GB \$333

VIDEO CARDS

ATI

Graphics Xpression 2MB ISA / PCI \$30 / 99
WinTurbo 2MB ISA / PCI \$232 / 214
Graphics Pro Turbo 2MB ISA / PCI \$250 / 221
Graphics Pro Turbo 4MB ISA / VLB \$400 / 354
Graphics Pro Turbo 4MB PCI \$313

matrox

Matrox MGA Millennium PCI 2MB VRAM \$243.35
Matrox Millennium ModVideo Capture Board \$215
Matrox Mystique 2MB PCI base \$235
Matrox Mystique 4MB PCI base \$235
Matrox Mystique 2MB memory upgrade \$5

VIDEO CARDS

DIAMOND

Imagine 128 PCI 2MB / 4MB \$309 / 453
Imagine 128 1600 4MB PCI \$41
9FXMotion 771 2MB PCI / VLB \$234 / 289
9FXMotion 771 4MB PCI / VLB \$356 / 227

DIAMOND

Stealth 64 Video 2121 PCI 1MB 2MB \$119 / 140
Edge 3D 2120XL 1MB PCI \$169
Edge 3D 2200XL 2MB PCI \$216
Edge 3D 3240XL 2MB PCI \$358
Edge 3D 3400XL 4MB PCI \$492

MONITORS

CIN

565D 15" \$337
1765GME 17" \$633
1765GME 17" / 1765XA 17" \$687 / 817

MAG

MD21F 21" \$1,560
DX1495 14" \$255
DX1595 / DX 15T 15" \$361 / 369
DX1795 / DX 17T 17" \$620 / 725

MAGNACOLOR

CM-4018, 17"ni Only \$595

- 17" flat square CRT
- 16.22" viewable image size
- 28mm tilt pitch
- Maximum display resolution 1280 x 1024
- Optimum display resolution 1024 x 768 @ 60Hz
- DPMMS and Energy Star power management
- Includes full panel base
- 3-year limited warranty (non-interlaced color monitor)

CM2015 15" 1024x768 \$309
CM2015 15" 1024x768 \$227
CM2015 15" 1024x768 \$237
CM2115 15" 1280 X 1024 \$330
CM2115 15" 1280 X 1024 \$330
20CM64 20" 1280x1024 \$899
20CM6500 20" 1600x1280 \$1,142
CM2137 21" 1600x1280 \$1,630

EIZO

F2-15 15" \$585
F2-17 / F2-17EX 17" \$289 / 936
F2-17 / F2-17TS 17" \$1,047 / 1,035
F2-21 21" \$1,802
FX-85 15" \$229
TX-C75 17" \$1,039

NEC

XV15 15" \$465
XV17 17" \$780
CA00 / CS00 \$287 / 375
M500 / M700 \$512 / 849

NOKIA

449E 15" \$445
447L / 447X 17" \$79 / 912

SONY

Multiscan 15" sxt \$379
Multiscan 15" sxt \$463
Multiscan 17" sxt / w/11 \$774 / 980
Multiscan 20" sxt \$1,857

ViewSonic

ViewSonic 15" GA / ES \$441 / 379
ViewSonic 17" EA / GS / PS \$332 / 639 / 735
ViewSonic 20" G / PS \$1,152 / 1,429

NETWORKING

3Com

3C509B / 5pk / 20pk \$101 / 454 / 1,658
3C509B-TP / 5pk / 20pk \$100 / 424 / 1,539
3C509B-TP / 5pk / 20pk \$94 / 401 / 1,446
3C509B-Combo / 5pk / 20pk \$113 / 496 / 1,828
3C590-TP / 5pk / 20pk \$112 / 511 / 1,789
3C590-Combo / 5pk / 20pk \$152 / 672 / 2,497
FMS II TP Hub 12 Port / 24 Port \$299 / 837
FMS II Fiber Hub \$1,810
FMS II Base Hub \$1,300
FMS II Management Module \$420

Intel

EtherExpress 16 coax \$98
EtherExpress 16 10BT / 5pk \$95 / 462
EtherExpress 16 combo / 5pk \$115 / 547
PRO/10Mbps PCI 5pk \$279 / 569
PRO/10Mbps EISA \$239
PRO/10 Flash 10BT / 5pk / 20pk \$123 / 417 / 1,436
PRO/10 Flash Combo / 5pk / 20pk \$103 / 608 / 2,316
MCA 10BT \$164
TokenExpress PRO ISA LAN adapter \$240
NetExpress EL Ethernet \$376
NetExpress XL Ethernet \$430

NOVELL

CD v4.15 / 10 user \$569 / 1,368
CD v4.125 / 50 / 100 user \$1,738 / 2,642 / 3,551
3.5" v3.12 5 / 10 user \$569 / 1,369
3.5" v3.12 25 / 50 user \$1,739 / 2,642
3.5" v3.12 100 / 250 user \$3,551 / 5,057

SMC

EtherEZ 10BT / Coax / Combo \$90 / 91 / 102
EtherPower 10/100BT PCI / 5pk \$138 / 647
EtherPower 10BT PCI / 5pk \$115 / 517
EtherPower combo PCI / 5pk \$144 / 665
PC080S color \$120
APCNET 8 port active hub coax \$223
TokenCard Elite 164 \$212
TigerHub TP6 port - AUI / TP12-12 port - AUI \$163 / 359
3608 8 port hub 10BT \$187

MULTIMEDIA

ALTEC

Attec 5 Channel Surround Sound System \$289
AMC2000 Attec Portable Multimedia \$368
ACS300 1.3 Piece System 36 Watt \$159
ACS33 3 Piece System 30 Watt \$125
ACS51 12 Watt / ACS52 18 Watt Speakers \$50 / 69
ACS150 4" / ACS250 6" Powered Subwoofer \$80 / 106

CONNECTIX

QuickCam for Windows \$92
Color QuickCam \$224

CREATIVE

Performance 6x / 8x \$392 / 392
Blaster CD R \$180
Sound Blaster 32 PnP \$148
Sound Blaster AWE32 PnP \$219
Sound Blaster 3D \$311
Wave Blaster II \$94
Discovery 8X CD ROM \$255

NEC

4Xc 7 disc Changer \$330
6X Int \$240
6X Ext \$329
6V / 8V Int \$31 / 145
BXI INT SCSI \$335

SONY

Spresna 9411S Recordable CD-ROM Int / Ext CALL

SUN MOON STAR

6x Int CD-ROM Drive \$152
6x Int Wave Table Kit \$230
Portable CD-ROM \$214

TAPE & REMOVABLE MEDIA

HP/COLORADO

T1000 Int / Ext \$136 / 180
Trakker 350MB \$150
Jumbo 350 Int / 1400 Int \$44 / 167
PowerTape 2400 24GB Int / Ext \$840 / 934
PowerTape 4000 4GB Int / Ext \$1,036 / 1,212



Imagex Dito Easy 800 Int / Ext \$97 / 141
Imagex Dito Easy 3200 Int / Ext \$229 / 289
Imagex Jaz 1GB Int / Ext \$375 / 465
Imagex Jaz Media 1GB / 5pk \$119 / 452
Imagex Zip 100MB SCSI \$189
Imagex Zip 100MB Parallel Port \$189
Imagex Zip 100MB SCSI \$189
Imagex Zip Media 100MB / 3pk / 10pk \$18 / 45 / 136

SYQUEST

EZFlyer 230 Parallel Port Drive \$289
EZFlyer 230 Removable Disk 1 PK \$29
EZFlyer 230 Removable Disk 3 PK \$75
EZFlyer 230 PC Internal SCSI \$291

MODEMS

BOCA

14.4 OnLine Express Int / Ext \$44 / 64
28.8 OnLine Express Int \$117
28.8 OnLine Express Ext \$185
V 34 28.8 w/Fax Int / Ext \$139 / 165
WinLink 402 V.34 \$308
SoundExpression 28.8 SPP Voice \$251

Hayes

Optima 28.8 Int / Ext \$235 / 424
Optima 28.8 Business Ext \$248
Optima 14.4 Int / Ext \$372 / 380
Accura 28.8 Int / Ext \$149 / 165
Accura 14.4 Int / Ext \$76 / 88

MOTOROLA

BitSurfer ISDN Ext Async \$334
ModemSurfer V.34 Int / Ext \$106 / 159
OnlineSurfer V.34 Int / Ext \$135 / 169
Marquis Ethernet 28.8 CALL

ALACRIS

V 34 Series II 14.4 Int / Ext \$85 / 76
V 34 Series II 28.8 Int / Ext \$130 / 149
ProClass V 34 14.4 Int / Ext \$119 / 135
ProClass V 34 28.8 Int / Ext \$177 / 271

US Robotics

Sportster Voice 28.8 Int / Ext \$161 / 167
Sportster Winmodem 28.8 Int \$107
Sportster V1 28.8 DSVD Int \$180
Sportster ISDN Int \$293
Sportster V1 28.8 Int / Ext \$166 / 186
Sportster V1 14.4 Int / Ext \$91 / 109
Courier "v Everything" 28.8 Int / Ext \$234 / 288
Courier I Int / Ext \$360 / 405

PROCESSORS

Intel

OverDrive DX4/75 / DX4/100 \$135 / 177
OverDrive Pentium 63MHz / 63MHz \$137 / 193
OverDrive Pentium 120/133MHz NEW \$282
OverDrive Pentium 150MHz NEW \$330
OverDrive Pentium 166MHz NEW \$480

888-588-4424

http://www.ahu.com/hartford
IL: 847-934-3380 FAX: 847-934-9724

Hartford Computer Group



IN CONVENIENCE AND VALUE!

YOUR BLOCKBUSTER SOURCE FOR ALL YOUR MOBILE COMPUTING NEEDS!

REFURBISHED UNITS AVAILABLE!
call for details
Quantity Trade-ins Accepted
(minimum 25 units)



Call TOLL-FREE

888-588-4424

http://www.awa.com/hartford
IL: 847-934-3380 FAX: 847-934-9724

SCANNERS

EPSON

ActionScanning System II 409
ES-1000C Business 563
ES-1200C Pro Scanning 1,099

HEWLETT PACKARD

Scanner 4s 4p 295 403
Scanner 4s 4p 925 2,421

LOGITECH

PageScan Color 307

MICROTEK

PageWiz 124
ScanMaker E6 547
ScanMaker III Flatbed 1,879
35T Slide Scanner 704
ScanMaker E3 375

RELISYS

Taurus 664
Scorpio 371

UMAX

Vista S6E 306

Vista S6E POL-E2 w/Photoshop LE 450
Vista S6E PCPRO2 w/Adobe Photoshop 581
Genix D-16 LE2 1,359
PowerLook II Pro CALL

PRINTERS

HEWLETT PACKARD

Deskjet 820C w/ 955C 389 475
Deskjet 890C 308
Deskjet 340 340 Platinum Printer 279 295
Deskjet 1600C 299
All laserjet models available CALL

Canon

BJC 21 Color 147
BJC 105X B-J 104 260
BJC-4100 BJC-610 Color 224 405

EPSON

DFX-5000 DFX-8000 9 Pin 1,399 2,363
FX 1170 FX 2170 9 Pin 379 447
FX 870 9 Pin LQ 1070 24 Pin 290 384
LQ 2170 LQ 2550 24 Pin 530 990
LQ 570 LQ 670 24 Pin 247 440
LJ 300 9 Pin 164
Stylus Color III Color IIs Ink Jet 274 160
Stylus Pro Pro XL Ink Jet 358 733
Stylus 1500 678

LEXMARK

Optra E 6ppm 600dpi 539
Optra R 8ppm 1200dpi 1,252
Optra C Color 3ppm Color 12ppm Black 5,981
Optra LX 16ppm 1200dpi 1,818
Optra LX 16ppm 1600dpi 2,857
4039 10 Plus 10ppm 600dpi 1,045
WinWriter 150c 185

OKIDATA

ML320 321 322 451
ML355 355C 1,025 1,368
ML520 521 365 514
ML550 551 449 575
1200IPS 1,350
OKIJET 2010 321
OKI2000 889
OKI600e 402
OKI610e OKI610e PS 489 699
OKI610e OKI610e PS 763 1,090
Pacemaker 3410 1,398

TEXAS INSTRUMENTS

MicroLaser Pro-B MicroLaser Pro-E 1,130 1,362
MicroLaser WIN4 423
MicroLaser PowerPro12 1,379

PC CARDS

Megahertz

28.8 Cellular Ready PC w/quick 224
28.8 Fax/modem w/quick 232
28.8 Ethernet Modem w/quick 10base-T 291
28.8 Ethernet Modem w/quick Combo 311
28.8 Ethernet Modem 10Base-T 365
Ethernet Adapter w/quick 10Base-T 111
Ethernet Adapter w/quick 10base-2 134

ADAPTEC

APA1480 Kit SCSI-2 PCMCIA w/Cable 165

MicroSolutions

Backpack 4x w/out sound 206
Backpack 4x w/sound 297
Backpack 6x w/out sound 257
Backpack 6x w/sound 349
Backpack 800T Portable tape drive 127

NEW MEDIA

WinSurfer 14.4 28.8 88 229
NetSurfer 14.4 28.8 121 211
Gamsurfer Sound Card 176
WAV Jammer 234
Bus Tweezer 180
Toshiba-Jam 443
LiveWire 140

Simple

28.8 Communicator Communicator w Simple Jack 227 211
14.4 Communicator 82
10Base-T Ethernet 79
360MB HD Type III 432

Xircom

Ether 10BT 129
Ethernet Adapter 159
Ethernet Modem 14.4 10BT 259
Credit Card Ethernet 14.4 287
Credit Card 28.8 353
Credit Card Ethernet Modem 383
Credit Card PCMCIA Modem 28.8 212
Credit Card IPS Token Ring 334
Credit Card IPS Token Ring Combo 349
Credit Card Netwave Adapter 288

PERIPHERALS

EPSON

Epson PhotoPC 474

ALPS

Portable Glide Point 47
105 Keyboard w/Glide Point 94
18 Key Keyboard w/Glide Point 2 Button 94

LOGITECH

Mouseman Combo Cordless 44 66
Tranman Live Cordless 121
Trackman Portable Vista 45 41

Microsoft

Nautil Keyboard 99
PS/2 Mouse 2 Serial Mouse 2 50 52

PLAY INC.

Snappy Video Snapshot 161

BATTERY BACKUP

APC

Back UPS 200 280 86 92
Back UPS 400 450 179 169
Back UPS 600 Pro 650 235 219
Back UPS Pro 280 420 149 229
Smart UPS vis 425 255
Smart UPS vis 650 1000 289 419
Smart UPS 700 1000 334 479
Smart UPS 1400 2200 599 780

NOTEBOOK CASES

TARGEM

Note Pac 37
Univera Note 68
Leather Notebook 99
Business Commuter 116
Sherpa Travel Case 165

NOTEBOOKS

AST

J10 P175 8500MB Dual 10.4" 1,720
J10 P175 8500MB Dual 10.4" 2,012
J30 P100 8500MB TFT 10.4" 2,063
J30 P100 8500MB Dual 10.4" 2,720
J50 P133 8500MB TFT 10.4" 2,392
P30 P100 8500MB Dual 11.3" 2,579
P50 P133 8500MB TFT 11.3" 4,205
P50 P133 8500MB TFT 11.3" 4,205

COMPAQ

Armada 4130T P133 161 36GB 11.3" TFT 4,285
Armada 1120 P100 8500MB 10.4 STN 1,832
Armada 1120T P100 8500MB 10.4 TFT 2,143
Armada 41100 P100 8500MB CD 11.3 STN 2,795
Armada 4120T P120 161 36GB 11.3 TFT 3,634
Armada 4120T P120 161 36GB 11.3 STN 2,982
LTE 5200 P120 161 36GB 11.3 TFT 4,343
LTE 5300 P133 161 36GB 12.1" TFT 4,749

HEWLETT PACKARD

5600CTS P133 161 36GB 12.1" TFT NEW! 5,950
5800CTS P133 162 36GB 12.1" TFT NEW! 6,434
5600CTS P120 161 36GB 12.1" TFT NEW! 5,780
5600CTS P120 161 36GB 10.4" TFT NEW! 5,240

IBM

365E 5X86C 100 8540MB 10.4" Dual 1,703
365ED 5X86C 100 8540MB 10.4" Dual 4x 2,399
365X P100 8500MB 10.4" Dual 2,274
365KD P100 8500MB 10.4" Dual 4x 2,185
365KD P120 8500MB 10.4" Dual 4x 2,838
365KD P120 8500MB 11.3" Dual 4x 2,456
560 P100 8500MB 11.3" Dual 2,599
560 P120 8500MB 12.1" TFT 3,647
560 P133 8500MB 12.1" TFT 3,999
760 P133 161 36GB 12.1" TFT 6,525

760E P120 8500MB 12.1" TFT Modem 4,370
760E P133 161 36GB 12.1" TFT Modem 5,711

760EL P133 161 36GB 12.1" TFT 5,193
760EL P100 8500MB 12.1" TFT 4x 4,299
760L P100 8500MB 12.1" TFT 5,099

HITACHI

C120T 8500MB 11.8" TFT 3,199
M120T P122 8500MB 11.8" TFT 4x CD-ROM 4,499
M133T P133 161 36GB 11.8" TFT 6x CD-ROM 4,999
E133T P133 161 36GB 11.8" TFT 2,999

NEC

2200C P175 8500MB 9.5" TFT 2,257
4000C P175 8500MB CD 10.1" TFT 3,691
4050C P100 8500MB CD 10.1" TFT 3,080
4050H P100 8500MB 10.4" TFT 2,789
4050H P120 8500MB 10.4" TFT 3,538
6000H P100 161 36GB 11.3" TFT 6x 3,826
6030H P133 161 36GB 12.1" TFT 6x 4,783
6030X P133 161 44GB 12.1" TFT 6x 5,229

TOSHIBA

100CS P175 8500MB 10.4 Dual B23 1,535
410CS P100 8500MB 11.3" Dual Scan 2,219
410COT P100 8500MB 11.3" TFT 2,711
610CT P100 8500MB 9.5" TFT 2,416
700CS P120 8500MB 11.3" Dual 3,999
700CT P120 161 36GB 11.3" TFT 4,873
720COT P133 161 36GB 12.1" TFT SVGA 5,332

SATELLITE

T110CS P100 8500MB 11.3" 1,835
T110CT P100 8500MB 11.3" TFT 2,420

SATELLITE PRO

420CDS P100 8500MB 11.3" Dual 6x 2,420
420COT P100 8500MB 11.3" TFT 6x 3,211

PORTAGE

T650CT P133 161 36GB 11.3" TFT 4,256

TECRA

500CS P120 8500MB 11.3" Dual 6x 3,582
500COT P120 8500MB 12.1" TFT 6x 4,550
730COT P133 161 36GB 12.1" TFT 5,925

NOTEBOOKS

olivetti

personal computers

Echos Notebook Family

starting at \$2,299

- Up to 133MHz Pentium® Processor
- 8MB or 16MB RAM and 40MB max
- 16 bit stereo audio w/speakers & microphone
- Up to 11.1" active-matrix display
- 1MB Video RAM
- PCMCIA Type 3 (II Type 2)
- Parapack Printing Device
- 800 x 600 SVGA Resolution
- PCI Bus 256 L2 Cache
- Windows 95 or Windows for Workgroups (Dual install, select one at initial boot-up)



Echos P100C 8500MB 11.3" Dual 6x CD-ROM \$2,299
Echos P120C 8500MB 10.4" Active 6x CD-ROM 2,799
Echos P120C 8500MB 11.3" Active 6x CD-ROM 3,599
Echos P133S 161 36GB 11.8" Active 6x CD-ROM 4,569

SHARP

PC9030 P120 8500MB 11.3" TFT 6x \$3,699
PC9070 P133 161 36GB 12.1" TFT 4x 4,999
PC9080 P133 161 36GB 12.1" TFT 6x 4,999
PC9020 P120 161 36GB 12.1" Dual 6x CALL
PC9050 P133 161 36GB 11.3" TFT 6x CALL
PC9040 P100 8500MB 11.8" Dual 2,199

HUGE SELECTION OF OVER 35,000 PRODUCTS

Delivering superior value from EVERY leading manufacturer.

KNOWLEDGEABLE SALES STAFF

What should you buy? HCG's sales people will help you determine the best solution for your needs.

CORPORATE, EDUCATION AND GOVERNMENT P.O.'s WELCOME

Volume pricing available. Bids also accepted.

30-DAY MONEY BACK GUARANTEE

FLEXIBLE SHIPPING OPTIONS. MOST ORDERS SHIP THE SAME DAY!

Free

CIRCLE 082 ON READER SERVICE CARD OR GO TO HTTP://WWW.PCMAG.COM/BuyertLink

http://www.awa.com/hartford

888-588-4424

MONDAY-FRIDAY
7:30-7:00 CST
SATURDAY
10:00-3:00 CST

Call for FREE Catalog

Hartford Computer Group, Inc. • 1610 Colonial Parkway • Inverness, IL 60067

VOTED BEST MAIL-ORDER!

EVERYTHING OVERNIGHT-\$5!
(up to 10lbs)

CLARIS

The essential Web browser authoring tool that lets you design powerful Web pages in minutes — without complicated programming

ONLY \$98⁹⁵



SAVE \$100!

Okidata QL610e PS Page Printer
Epson® LED printer, 600 dpi output, 100 sheet paper input tray included

NOW ONLY \$699

23538

Viewsonic PaperPort Ix Keyboard Scanner
Print, fax, e-mail or send it FREE Netscape Navigator!

30384

ONLY \$329⁹⁵

Hayes

Optima V.34 PC Card Modem
Pop-out RJ-11 E Jack connector, data throughput up to 230,400 bps

ONLY \$199⁹⁵

18877

NEW!

StarNet Internet Utilities

Instantly access and organize Web sites, track time and online activity & synchronize your bookmarks & Favorites with point & click ease

29595

SPECIAL INTRO PRICE! \$39⁹⁵

SyQuest EZ Flyer 230
The 230MB removable hard drive with a rugged compact design for easy portability

ONLY \$299

30183

NEW AGFA

SnapScan Scanner
300x600 dpi optical resolution, 24-bit high-speed one pass scanning. Great for the home office/entry level user

ONLY \$379

31533

"Best Mail-Order Company!"



PC Connection was awarded "Best All-Around Company" for the second year in a row by The Boston Computer Society!



PC World World Class Award Winner for Best Mail Order. An unprecedented six times.

- 100MHz Pentium processor
- Color display & full-size keyboard
- Removable CD-ROM and floppy drives
- 5-year warranty

- V.34 fax modem
- Stereo speakers & Sound Blaster Pro compatible audio
- Choice of Windows 95 or Windows for Workgroups



M SERIES NOTEBOOKS

AS LOW AS

\$2799

LEASE FOR \$93⁶⁶ PER 36 MONTHS

30235-30236

- 120MHz Pentium CPU
- 8MB RAM, 850MB HDD
- 8X CD-ROM drive
- Windows 95 preinstalled



P120 MULTIMEDIA PENTIUM

ONLY

\$999

Monitor sold separately

30690

Sens 800 Series Notebooks

STARTING AT

\$1799

LEASE FOR \$58⁹⁴ PER 36 MONTHS

- Pentium processor
- Touchpad pointing device
- 4X or 6X CD-ROM drive available
- Removable HDD
- Includes NTSC PAL TV Presentation Software
- 3-year warranty

31107



PRICE DROP! ThinkPad 365ED!

CALL NOW!

- 100MHz Cyrix 5x86 processor
- 8MB RAM, 540MB HDD
- 10.4" DSTN VGA display
- Built-in speaker
- Windows 95 pre-installed

FREE! Lotus SmartSuite 96 CD!

\$1998

LEASE FOR \$69³⁶ PER 36 MONTHS

28814

PLUS

...Integrated 4X CD-ROM, MDI/Joystick port, ext. 1.44MB floppy drive and 16-bit audio!



ACERVIEW 56E 15" SVGA MONITOR

\$379⁹⁵

COMPAQ

DESKPRO 2000 5100/630

- 100MHz Pentium processor
- 8MB ECC RAM
- 1.44MB floppy, 630MB EIDE HD
- Keyboard & mouse
- Windows 95 or Windows 3.1

AS LOW AS

\$1099

LEASE FOR \$38¹⁵ PER 36 MONTHS

31557



CATALOG SUBSCRIPTION CALL TODAY! 800-800-0004

(Mention source code 1096PCM. Please check the catalog(s) you wish to receive)

☐ PC Connection ☐ MacConnection

Name _____ Apt. _____
Address _____ State _____ Zip _____
City _____

OUR POLICY: VISA, MASTER, AND AMERICAN EXPRESS and E-Check Payments. No cash charge. Most products are available by mail order. Funds are only applied to orders for at least 48 days before the invoice date. *Australia requires prior authorization. *Orders for HMA are not responsible for shipping charges. *International orders are available to shipping with out-of-state. Continental U.S. Shipping Charges: Shipping charges for orders shipped to the continental U.S. are \$1 per pound. Please visit our website for shipping information. *During event shipping our standard credit card orders are shipped on weekdays 9 a.m. ET with ship. *Orders for delivery the next business day, Saturday delivery, available many states upon request at an additional charge. *Orders shipped to Alaska, Hawaii, Puerto Rico, and U.S. Virgin Islands require an extra day delivery. *APO/FPO, International orders and Hawaii, Alaska, Canada, Puerto Rico & U.S. Virgin Islands. Shipping may include additional charges. *Atlanta, GA: Call 800-446-0004 or FAX 603-446-7791. M-F 9 a.m.-5:30 p.m. ET

©1996 PC Connection, Inc. Marlow, NH. The name and character are a registered trademark of PC Connection, Inc. All other trademarks remain the property of their respective companies.

FREE Technical Support!

FREE System Customization Overnight!

FREE Catalog Subscription!

FREE Memory Installation Offer!

MORE Exciting Bundles!

MORE Hot New Products!

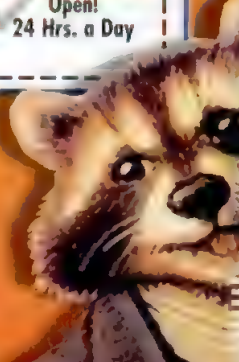
ALWAYS Available! Knowledgeable Sales Reps.

ALWAYS Open! 24 Hrs. a Day

PC Connection

SOURCE CODE 1096PCM 800-800-0004

Order as late as 3 a.m. ET and still get overnight delivery!
FAX US AT 603-446-7791





Increase Your Storage Capacity While Maintaining World Class Speed.



*Transfers data 3
times faster than
other portables.*

It's a clear-cut victory for the backpack 8000t, the fastest tape backup system in the field. It has a big 8GB capacity, and it's portable. This powerful drive transfers data at up to 30MB per minute. That's 3 times faster

than you'll find elsewhere. Using a single Travan TR-4 tape, backup your large hard drives in record time. But that's not all. Installation is a breeze. Plug the backpack 8000t into your printer port and your printer into the backpack. There are no expensive card options to deal with.

Then unplug and take it with you to backup data on other PCs. The backpack 8000t gives great performance at a price well under external DAT drives.

Now that's what you call a winner!



*Plugs into any standard
printer port. Share data
between portables,
desktops and laptops.*



backpack
8000t

MicroSolutions
The port•ability leader.

Ph: 800-293-1214 (US and Canada)
or 815-756-3411, Fax: 815-756-2928
Internet: www.micro-solutions.com
CIRCLE 855 ON READER SERVICE CARD



*Soaks up twice
as much data as
a TR-3 drive*

Available through computer dealers, computer superstores, and mail order catalogs. Travan is a trademark of 3M
CDW 800 736 4239 • Global Computer Supplies 800 845 6225 • Inmac 800 547 5444 • Micro Warehouse 800 367 7080 • Midwest Micro 800 413 9856
PC Connection, Inc. 800 800 5555 • PCs Complete, Inc. 800 514 4727 • PC Zone 800 258 2088 • Quil 800 789 0605 • USA Flex 800 872 3539



Now More Than Ever...

40,000 products!!
Shipped same day at lowest prices.

✓ Knowledgeable Sales Staff ✓ Fast Delivery ✓ Quality Top Name Brands ✓ Technical Support

NETWORKING

CISCO ISDN Access Router	939
CISCO IP-10X Serial Router	1378
3Com	
3C509B Etherlink III ISA card	109
3C509B Etherlink III ISA card (5-pack)	499
3C509BTP Etherlink III ISA 10BT	105
3C509BTP Etherlink III ISA 10BT (5-pack)	419
3C509B Combo Etherlink III ISA card & 10BT	119
3C579 Etherlink III EISA card or 10BT	226
3C580TPO Etherlink III PCI 10BT	119
3C585TX Fast Etherlink PCI 10/100BT	150
3C16181 Linkbuilder 8-Port Hub	568

ARTISOFT	
LanTastic Upgrade V1.0 Win 95 CD	69
LanTastic V1.0 Win 95 Starter Kit	259
LanTastic V5.0 1-user/5-user	79/319
LanTastic V5.0 Network Starter Kit	219

ALL MODELS IN STOCK CALL TODAY!

intel	
EtherExpress 16C combo	118
EtherExpress Pro 10+ combo	116
EtherExpress Pro 10/100 PCI	209
EtherExpress Flash 32 EISA combo	199
Netport Express Ethernet	378

LINKKEYS	
Combo PCMCIA Ethernet Card	129
Combo Ethernet Adapter 8-pack	225
Combo Ether 16 LAN Card	39
10BT 16-Port Hub	269
100B-TX 12-Port Hub	1119

MICRODYNE	
NE2000+ 10BT/COAX	75/75
NE4200 PCMCIA 10BT or COAX	157

PACIFIC DATA	
DirectNet 10BT Ethernet to IP LAN Kit	279
DirectNet EX external print server	315
DirectNet XIO	299

SMC	
Arnet PC130 / PC270E	72/98
Arnet PC600 Workstation	119
Arnet Hubs 8-port active coax	219
Ether16C Ultra Ethernet COMBO card & 10BT	102
Etherpower 10/100 PCI 10BT	139
Tigerhub TP8 10BT Hub (8-port)	162

THOMAS-CONRAD	
3047CX 32-bit EISA 100MB	597
3045-CX 100Mbps ISA card	439

TRENDWARE	
TE-16XP/CT 16-bit Xpress Combo ISA	29
TE-16HP Plug-n-Play Combo ISA	35
TE-200CT PCMCIA II Combo RJ45	99
TE100-PCI 10/100 PCI Card	99
TE100-HB 8-port 100Base-TX Hub	649

Xircom	
Creditcard IPS Ethernet 10BT	132
Creditcard IPS Ethernet COMBO 10BT & coax	169
Creditcard IPS Ethernet token ring	369
Pocket Ethernet Print Server Coax or 10BT	279

NOVELL	
Call for discount pricing on all NetWare Software!	

MULTIMEDIA

MULTIMEDIA KITS	
Turtle Beach 6X Kit - sound, +50 titles	219
Turtle Beach 8X Kit - sound, +50 titles	245

CREATIVE	
Blaster CD 8X	139
Discovery CD 16 4X int. PnP.	272
Discovery 8X	255
Performance 8X	319

DIAMOND	
Diamond 800 8X	225
Diamond Ultra 8000 8X	329

VIDEO CAPTURE	
ATI Tech Pro PC TV Plus	139
ATI Tech WaveWatcher/TV2	280
ATI Video Basic	179
Intel Smart VideoPro	398
PictureTel Live PCS50 w/headset ISA	2599
TrueVision 2000 Series	CALL
TrueVision Targa+ 16	1069
Sigma Real Magic Ultra MPEG	359

CREATIVE	
PhoneBlaster 28.8 int. S/R FAX E-mail	232
Sharevision PC3000 w/ video	899
VideoBlaster MP400 full screen/full motion	285

DIGITAL CAMERAS	
Kodak DC200 NEW!!	329
Kodak DC40	599
Kodak DC50 Lowest Price Around!	

PC SPEAKERS	
Creative Labs CS200 Soundblaster	59
Creative Labs SBW500 40-watt w/subwoofer	99
LabTec 3210 20-watt	79
NEC Audio Tower	59
Panasonic EAB401P	45

ALTEC LANSING	
ACS53 System w/subwoofer	125
ACS300.1 System	165
ACS500 5-Channel Dolby Surround	299

SONY	
SRS-PC50 5-watt	86
SRS-PC91 10-watt	129
SRS-300D 10-watt w/15-watt subwoofer	162
SRS-D4KPC 30-watt w/subwoofer	209

SOUND BOARDS	
CREATIVE	
Sound Blaster 16 Value IDE	89
Sound Blaster 32 IDE PnP	149
Sound Blaster 32 AWE PnP	219
Wave Blaster II Daughter Bnd w/Game Pk.	99

MediaTrix	
mediaTrix AudioTrax-Pro	219

Turtle Beach	
Audio Advantage PCMCIA	129
Waveblaster 32	135
Turtle Beach Tropez	220

Wavjammer 16-bit PCMCIA	219
Multimedia Combo SCSI	369

DESKTOPS

Wyse Terminals ALL MODELS IN STOCK	
Business Class PC's	
AST	
Bravo MS P-100 1 2GB 16M	1439
Bravo MS P-120 1 6G 16M	1579
Bravo MS P-166 1 2G 16M	1929

Canon	
9210 P-120 1 6G 16M 8X CD 33.6 FAX	1499
9350 P-133 1 6G 16M 8X CD 33.6 FAX	1799
9610 P-166 2 1G 16M 8XCD 33.6 FAX	2229

COMPAQ	
Deskpro 2000 P-100 1 2G 8M	1295
Deskpro 2000 P-120 1 2G 8M	1419
Deskpro 4000 P-133 1 6G 16M	1895
Deskpro 5150 P-150 2G 16M	2239
Deskpro 6000 P-180 2 1G 32M	4029
Deskpro XL 6/200 2 1G 32M	5569
PROLiant 1500 4500 Series	BEST PRICES
PROSIGNIA Series	BEST PRICES

IBM	
PC350 P-100 1 2GB 16M	1579
PC330 P-133 1 2GB 16M	1749
PC350 P-166 1 2G 16M	2199

Multimedia PC's	
(Models listed below come complete with an integrated 8X CD-ROM drive, 28.8 or higher modem & more.)	
AST Advantage 829 P-200 2.5G16M	2549
Canon Innova 9210 P-120 1 6G 16M	1499
Compaq Presario 4716 P-200 2 5G 32M	CALL
HP Pavilion 7285 P-200 3 1G 32M	2969
IBM Aptiva 578 P-200 3.2G 32M	CALL

NOTEBOOKS

SEE THE FOLLOWING PAGE FOR
TOSHIBA & IBM
BEST SELLING NOTEBOOKS!

AST	
Ascentia J 10 P-75 8/500M 10.4" Dual	1779
Ascentia J 30 P-100 8/800M 10.4" Dual	2115
Ascentia J 50 P-133 8/800M 10.4" TFT	2885
Ascentia P50 P-133 1 2G 8M 4xCD 11.3" Act	3799

Canon	
NoteJet III P-75 540M 8M 10.4" TFT	3759

COMPAQ	
Armada 4110 5/100 8/810M 10.4" Dual	2433
Lie 5200 P-120 1 35G 10.4" Act Cir	CALL
Lie 5300 P-133 16M1 35G 11.3" Act Cir	4699

MAGNETRON	
600S2S4 P-90 540M 8M 4xCD 11.3" Dual	2569
600TF313 P-120 1 3G 8M 4xCD 10.4" TFT	3199
610 P-133 2 1G 16M 12.1" Active	3699
620TF132 P-120 2 1G 8M EDO	3989

NEC	
Versa 4050C P-90 810M w/CD 10.4" Actv	3179
Versa 6030H P-133 16M 35GB w/CD 12.1" TFT	4929

TEXAS INSTRUMENTS	
Extensa 5700CDT P-100 1 2G 10.4" Actv	2949
TM5200 Pentium 120 1 2G 8M 11.3" TFT	2949
TM5300 Pentium 133 1 2G 8M 11.3" TFT	3349

MONITORS

EIZO	
F2 15 15" 28mm 1280x1024 TCO	585
F2 17 17" 28mm 1280x1024	839
F2 17EX 17" 26mm 1600x1200 TCO	949
T2 17TS 17" 25mm 1600x1200 TCO	925
T2 17 17" 25mm 1280x1024 TCO	979
T2 20 20" 30mm 1280x1024 TCO	1849

MAG	
DX1595 15" 1280x1024 28mm	369
DX1795 17" 1280x1024 25mm	629
DX15T 15" 1280x1024 25mm	375
DX17T 17" 1280x1024 25mm	635

MAGNAVOX	
7BM749 14" VGA Mono 720x400	109
CM2099 14" VGA 1024x768 28mm	239
CM2015 15"	309
CM1215 15" EVGA 1024x768 28mm	329
CM4018 17" 1280x1024 28mm	595
20CM64 20" 1280x1024 31mm	899
CM5600 20"	1129

MITSUBISHI	
Diamond Pro17HX 17" 1280x1024 28	749
Diamond Pro21TX 21" 1600x1200 30	1579

NEC

XV15+	469
XE21	1699
XP17 / XP21	1049/1999
C500 15" 28 PnP 1280x1024	375
M500 15" 25 1280x1024	479
M700 17" 25 1280x1024	759

NOKIA

449E 15" 1280x768 28mm	449
447L 17" 1280x1024 28mm MPRII	685
447L 17" 1600x1200 25mm MPRII	899
445X 21" 1600x1200 25mm MPRII	1899

SONY

CPD-15SX1 15" 1280x1024 25mm	379
CPD-15SF2 15" 1280x1024 25mm	445
CPD-17SF2 17" 1280x1024 25mm	749
GDM-17SE2T 17" 1600x1200 25mm	969
CPD-20SF2 20" 1280x1024 25mm	1599

ViewSonic

V15ES 15" 1024x768 28mm	345
V17EA 17" 1024x768 27mm	625
P810 20" 1600x1280 25mm	1649

VISIONMASTER by ViewSonic	
MF-8617E 17" 1280x1024 26mm	699
MF-8221E 21" 1600x1200 28mm	1539
MF-9C21E 21" 1600x1200 30mm	1639

PRINTERS

Canon	
BJ-30	255
BJC-70	349
BJC-210	149
BJC-4100 720x360dpi Color	229
BJC-610 720dpi Color	429

EPSON	
LQ1070+/LQ2170	384/526
Stylus 1000	474
Stylus Hx/Stylus Color II	165/239
Stylus Pro XL (12.5"x18")	1699

FARGO	
Fotofun 3x5 color printer	425
Primera Pro	1339
Primera Pro PS w/Photoshop	1849

HEWLETT PACKARD	
DeskJet 680C 5ppm 600dpi	299
DeskJet 820CXI 8ppm 600dpi	385
DeskJet 870CXI 8ppm 600dpi	489
DeskJet 1600C/DeskJet 1600CM	1299/1899
LaserJet 4V 16ppm 600dpi 11x17	1899
LaserJet 4MV 16ppm 600dpi 11x17	2772
LaserJet 5LFS 4ppm 600dpi	469
LaserJet 5P 6ppm 600dpi	849
LaserJet 5MP 6ppm 600dpi Pictscript	999
LaserJet 5 12ppm 4MB	1259
LaserJet 5M 12ppm 6MB 600dpi	1725
LaserJet 5N 12ppm 600dpi e-net	1529
LaserJet 5Si 24ppm	2779
LaserJet 5SiMX 17ppm 600dpi	3892
Color LaserJet 5 12ppm 4MB 600dpi	5829
CopyJet Color Inkjet	2339

SEE PACIFIC DATA FOR
JETDIRECT SAVINGS!

LEXMARK	
Optra E 6ppm 1MB 600dpi	549
Optra R+ 12ppm 2MB 1200dpi	1279
Optra LX+ 16ppm 4MB 1200dpi	1949

OKIDATA

184 Turbo	225
320 / 321	315/442
520 / 521	379/489
590+ / 591+	439/599
395 / 395C	999/1099
600e/610e/610ePS	399/489/699
Laser 810 LED 8ppm/1200 759/985	
Okidjet 2010 COLOR!!!	269

Panasonic

KXP-3626 / KXP-3698	409/449
KXP-6100 / KXP-6500	409/439

QMS

MagiColor Laser	3269
-----------------	------

SEIKO SII

Smart Label EZ40	139
------------------	-----

DRIVES

CD-ROM DRIVES	
CSD-880E 4x ATAPI Kit	145
Disctec CD6X Parallel Port	219
Disctec 4x 650M RCD	189
Microsolutions 4X Par Port	209
NEC 6X1 / 6XE	249/349
Panasonic KXLD-740 2 PCMCIA	389
Plexitor 4Plex 4x 170ms SCSI-2 int.	219
Plexitor 6Plex 6x 145ms SCSI-2 int.	259
Plexitor 8Plex 8x 115ms SCSI-2 int.	379

PINNACLE MICRO	
10Xtime 10X NEW	185
RCD Explorer / RCD 5040 int.	739/789

SONY

CSD-880E 4x ATAPI Kit	145
PRD-250 Discman Kit	339
CSP9405 2x Rec 4x Play PnP int.	699
CSP94115 2x Rec 4x PnP ext.	819

TOSHIBA

XM5602BS 8X int. ATAPI	119
XM5401BS 4X int. SCSI	129

REMOVABLE STORAGE

IOmega Ditto 800 800MB parallel	145
IOmega Ditto 3.2G int. Travan	219
IOmega Zip Drive - IN STOCK	189
IOmega Jaz 1 GB int.	379
IOmega LFF 7304 1.5GB int.	2129
Pinnacle Micro Verlex 2 6GB Kit	1379
Syquest EZ135 int.	119
Syquest EZ-Flyer 230 Par	289

HARD/FLOPPY DRIVES

Fireball 1280 1 28G FATA	209
Maxtor 71626AP 1 6G EIDE	235
Microsolutions Par. Port Floppy	145
Microsolutions Backup 1.2G Par	359
Sony 1 44MB 3.5" Floppy	39
Teac FD505 Dual Floppy	95

CONNER

CFS850A 850M IDE	199
------------------	-----

MICROPOLIS

4221 2.1GB SCSI	579
1991W 9 09 Wide	1789

QUANTUM

Quantum Bigfoot 1.28G FATA	179
Quantum CM34300 4 2GB SCSI	999

Seagate

Seagate ST5108A 1GB ATA	189
Seagate ST3630A 630M ATA	145

WESTERN DIGITAL

AC22850 850M EIDE	175
2100RTL 2 1GB EIDE	309

CONTROLLERS

Accugrip Side V.L. EIDE 2 ser. 1 par	79
AdvanSys ABP 542 S-2 SA PnP	135
AdvanSys ABP 542 S-2 PC PnP	135
AdvanSys ABP 542 S-2 VLP PnP	135

YOUR COMPLETE COMPUTER SOURCE!

BUY FOR LESS!



CALL MIDWEST!

NETGEAR

from Bay Networks

EN308 8-Port Ethernet Hub

- At-A Glance LED Indicators
- Switchable BNC/AUI Port
- MDI port for network expansion
- 8 10Base-T Ports

EASY INSTALLATION!!

From the Ethernet Hub Market Leader

\$139



DISCTEC RoadRunner Express CD-4x Ext. CD-ROM Drive

- Connects to parallel port, IEEE1284
- CD 4x 600KB/sec. transfer rate, 230ms access time
- DOS and Win. OS/2 & 95 drivers included
- Front loading motorized tray, headphone jack
- MPC Photo CD and Audio CD compatible
- EASY TO INSTALL, no hardware configuration



Only!
\$189

THE BIGGEST DISPLAY YOU WILL EVER FIND!

IBM

ThinkPad 760CD 12.1" ACTIVE COLOR

P-120MHz, 12.1" Active Color, 28.8Kbps Modem & 1.2GIG Hard Drive!

- 8M RAM 1M VRAM
- Quad speed CD ROM Drive
- 3.1 9.0 hr. Li-Ion Battery
- PC Card Slots: 2 Type II or 1 Type III
- Video Capture & MPEG 2 Playback
- 16 bit Stereo WaveTable Audio Sound Blaster Support



Lease on IBM for as low as
\$89 a month

Best Selling ThinkPads

ThinkPad 365X P-100 810M 8M 10.4" Dual Scan Color	NEW!!	1969
ThinkPad 365ED P-100 540M 8M 10.4" Dual Scan Color 4xCD	NEW!!	2069
ThinkPad 560 P-120 810M 8M 11.3" Dual Scan Color		2598
ThinkPad 560 P-120 810M 8M 12.1" TFT Color		3629
ThinkPad 760C P-120 720M 8M 12.1" TFT Color		5498
ThinkPad 760CD P-120 1.2G 8M 4xCD 12.1" Active Color (pictured above)		6499
ThinkPad 760ED P-133 1.2G 16M 12.1" Active Color 4xCD MPEG		6899
ThinkPad 760E P-133 1.2G 16M 12.1" Active Color	NEW!!	5399

Call for other ThinkPad models, docking stations and other accessories

OVERNIGHT SHIPPING

FedEx FREE



100% of upgrades available. If you don't see your system listed, call today!

AST			IBM		
Ascenta 900N	4MB 8MB	78/87	ThinkPad 701C	4MB 8MB	41/92
Ascenta 950N	8MB 16MB	131/267	ThinkPad 755	8MB	92
Ascenta J	8MB 16MB	70/152	ThinkPad 760E 365X	8MB	92
COMPAQ			ThinkPad 760	8MB	121
Contura 400CX	4MB 8MB	70/93	NEC		
LTE Elite	4MB 8MB	47/98	Versa S	4MB 8MB	35/76
LTE Elite 5000	4MB 8MB	77/145	Versa 500H 6030H	8MB 16MB	CALL
Armada 1120 1120T 8MB 16MB		79/149	TOSHIBA		
Concerto Series	4MB 8MB	85/136	L2100	8MB	59
HEWLETT PACKARD			L2100	16MB	147
LaserJet 4J D1200	1MB	28	T400 410	8MB	88
LaserJet 4P 4x 4v	4MB	30	T610	8MB	119
LaserJet 4S 4S4MX	4MB 8MB	68/98	Tecra T700	8MB	97
LaserJet 5L	4MB 8MB	107/207	Tecra T72C	16MB 32MB	158/291
LaserJet 5SV/5SI MX	16MB	116			

SIMM Modules

- IN STOCK -

- 1MB or 4MB x9 70
- 1MBx32 or 36 70
- 2MBx32 or 36 70
- 4MBx32 or 36 70

\$9.00

BEST SELLER

TOSHIBA Tecra 720CDT

P-133MHz, 12.1" Active Color & a Built-in 28.8Kbps Data/Fax Modem!

- 18MB EDO RAM, 1.2GB HDD
- 6X CD-ROM Drive INCLUDED!
- 16 bit Sound Blaster Pro Compatible Sound System w/ WAV & MIDI
- PC Card Slots: 2 Type II or 1 Type III



\$89 a month

Lease a Toshiba for as low as



SATELLITE & SATELLITE PRO SERIES

T110CS Pentium 100MHz 810M 8M 11.3" Dual Scan Integrated AC Adapter	1969
T420CDS Pentium 100 810M 8M 11.3" Dual Scan 6xCD	2479
T420CDT Pentium 100 1.2G 8M 11.3" Active Color 6xCD	3249
PORTEGE SERIES	
T610CT Pentium 90 720M 8M 9.5" Active Color	2459
T650CT Pentium 133 1.2G 16M 11.3" Active Color	4399
TECRA SERIES	
TECRA 500CS Pentium 120 1.2G 16M 11.3" Dual Scan 6xCD	3649
TECRA 500CDT Pentium 120 1.2G 16M 12.1" TFT 6xCD	4629
TECRA 720CDT Pentium 133 1.2G 16M 6xCD 12.1" Active (pictured above)	5499

Call for other docking stations and other Toshiba accessories

US Robotics Sportster Winmodem™ Internal 28.8

FREE FAX & INTERNET SOFTWARE!!

- Max throughput 115,200 bps
- High speed data 28.8 Kbps
- Upgradeable to 33.6
- High speed fax, V.17 Group III 14,400 and 9600 bps Class 1 & Class 2.0 send and receive fax

So easy to use
\$115

5-Year Warranty!

UMAX Vista S12 Scanner

- 600x1200dpi Optical, 9600dpi max Resolution
- Adobe Photoshop LE Version, Presto, PageManager OCR, ASAP WordPower presentation software & SCSI II interface included



Graphics for professionals
\$769

POWER PROTECTION

APC

AMERICAN POWER CONVERSION

Protect Your Investment!

BACK-UPS PRO PnP SERIES
APC introduces the world's ONLY Plug-and-Play UPS with PowerChute Win 95 Management Software!

Back UPS Pro 280-420	140/230
Back UPS Pro 650	280

BACK-UPS VS SERIES

The World's Best Value in Power Protection!
Back-UPS 280-420B 99.145
Back-UPS 450-650B 169.237
Back-UPS 650-1250B 328.432

SMART-UPS VS SERIES

Includes PowerChute Power Management & Diagnostic Software for networks!

Smart UPS 420 V-550 VS	259.295
Smart UPS 1200 V-1400 VS	435.559

SMART-UPS SERIES

Performance Power Management for Advanced Business Networks!
Smart UPS 450-1200 275.338
Smart UPS 1400-2800 594.1029

SURGE SUPPRESSORS

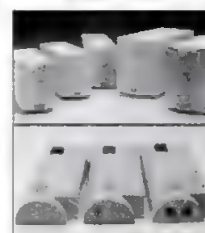
Protect Net Network Cable Protector	23
Personal SurgeArrest Strip 6 outlets	19
Personal SurgeArrest 6 w/ RJ11	25
Personal SurgeArrest 6 w/ CATV	34

UPS MANAGEMENT SOFTWARE

PowerChute+ for Novell	59.99
PowerChute+ for Win/Win NT	59.69

UPS's Starting at

\$99



YOUR APC HEADQUARTERS!

Starting at **\$254**

High Standard, Low Price—Affordable 28.8kbps Modems!

Megahertz 28.8kbps PC Card Fax Modems deliver the performance and compatibility of V.34 with the convenience of the built-in X1ACK connector

CALL FOR A FREE CATALOG!

KEY CODE CPB10/6



PC MAGAZINE OCT. 18 '96

NATIONAL DIRECT ORDER LINE

Where Corporate America Shops!

800-82-WORKS

(1-800-829-6757)

CIRCLE 010 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

HOLD EVERYTHING!



It's Almost Here.

Coming soon on the World Wide Web.



The new one-stop, shopping service for computer buyers from COMPUTER SHOPPER.

CIRCLE 303 ON READER SERVICE CARD

Discover the Power[®]

With the Best-Selling Software Books on the Planet.



**SPECIAL EDITION "USING" Books.
Only from QUE.**

**Rated #1 in the World by Software Experts
and Users Just Like You.**

*You'll work faster and smarter when you unlock
the secrets of your software. Each book features step-
by-step instructions, tips, and shortcuts that will
transform you into a master of your software universe.*

**PCWEEK & PC MAGAZINE BOOKS.
Only from Ziff-Davis Press.**

**A Favorite with Programmers and
Professionals Just Like You.**

*You'll learn advanced concepts quickly and efficiently
when you use these powerful tools. Many books
feature a disk of fully executable, powerful, and
productivity-enhancing utilities created by its author.*

que[®]



The Experience... The Vision.

**For more information on these and other Que and Ziff-Davis Press products, visit your local bookstore, or call 1-800-772-0477.
You can also find Que on the Internet at www.mcp.com/que/.**

Ziff-Davis Press, ZD Press, PC Magazine, PCWEEK, and Logical Operations are the registered trademarks of Ziff-Davis Publishing, Inc. All rights reserved. Copyright © 1998. Microsoft, Windows, Windows NT, and Windows 95 are registered trademarks of Microsoft Corporation. All other trademarks are the property of their respective owners. Ziff-Davis Press, ZD Press, PC Magazine, PCWEEK, and Logical Operations are the registered trademarks of Ziff-Davis Publishing, Inc. All rights reserved. Copyright © 1998. Microsoft, Windows, Windows NT, and Windows 95 are registered trademarks of Microsoft Corporation. All other trademarks are the property of their respective owners.

CIRCLE 178 ON READER SERVICE CARD

PC MARKETPLACE

I N D E X

Premier

The color showcase that puts the spotlight on leading-edge PC products and services.

298-318

HARDWARE

	PREMIER	CLASSIFIED
Batteries.....		319
Boards/Components/Chips.....	299,303	319
Communications.....	302	
Computer Systems.....	306	322
Input/Data Acquisition/Barcode/POS.....	304,306	323
Mass Storage Devices.....	308	
Multi-Media.....	310	
Music/Midi.....		
Networking.....	310	325
Peripherals.....	311	
Power Supplies.....		
Security.....		
Video.....	312	

SOFTWARE

	PREMIER	CLASSIFIED
Barcode.....		
Business Applications.....	312	325
—Single-Solution.....		
Business Utilities.....	313	325
CD-ROM Titles.....	312	
Cellular Phones.....		
Communications.....	314	

Classified

Flexible-format display advertising: computer systems, components, software and more.

319-333

Data Entry.....	
Database.....	
Desktop Publishing.....	
Education.....	314.....326
Entertainment/Games.....	317
Financial/Accounting.....	
Foreign Languages/Font/Translation.....	
Graphics/Design/CAD.....	317
—Digital Output Service.....	
Health/Fitness/Nutrition.....	
Human Resource.....	
Mailing List Management.....	
Manufacturing/Inventory.....	
Mapping/Demographic.....	
Medical/Dental.....	
Multi-Media.....	317
Music/Midi.....	
OS/2.....	
Personal.....	
Programming Tools/Languages.....	
Real Estate.....	

MARKETPLACE SALES - 800 - 825 - 4237

BusinessCard

A forum for innovative, hard-to-find and low cost PC hardware, software and services.

334

Religion.....	326
Scientific/Engineering.....	
Security.....	326
Shareware/Public Domain.....	
Statistical/Research.....	
Utilities.....	
Windows.....	318.....327
Adult.....	331

SERVICES

Computer Insurance	327
Data Conversion/Data Recovery	328
Desktop Publishing	
On-Line	318 328
Scanning Services	
Software Duplication	328
Training/Tutorial	

MISCELLANEOUS

	PREMIER	CLASSIFIED
Accessories.....		330
Books/Catalogs.....		
Business Opportunities.....	318	
Career Opportunities.....		
Supplies.....		330

◆Brian Gleason
Northeast x5150

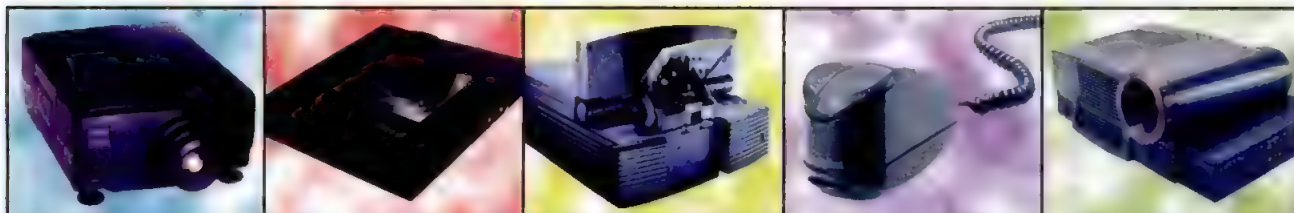
◆John Burke
Southwest x5076

◆Neil Goldstein
Midwest x5188

◆Alyson O'Regan
Southeast x5138

◆Bill Herbst
Sales Manager x5965

IF WE DON'T SELL IT, IT'S NOT WORTH LOOKING AT.



PANELIGHT IS YOUR ONE STOP SHOP FOR ALL LEADING BRANDS • SALES, RENTALS, & LEASES • MONEY BACK GUARANTEE.

PANELIGHT OFFERS THE BEST IN SELF-CONTAINED LCD PROJECTORS, LCD PROJECTION PANELS, SUPER-BRIGHT OVERHEADS, MULTIMEDIA MONITORS, PC-TO-TV CONVERTERS AND ACCESSORIES FROM THE WORLD'S LEADING MANUFACTURERS SUCH AS HITACHI, IN FOCUS, PROXIMA, NEC, NVIEW, POLAROID AND OTHERS.



CALL THE EXPERTS AT
PANELIGHT DISPLAY SYSTEMS, INC.

IT'S OUR BUSINESS TO ENSURE THAT YOUR BIG IDEAS GET THE ATTENTION THEY DESERVE - NO MATTER WHAT THE VENUE. WE ACTUALLY KNOW AND SELL THE LEADING BRANDS. WE CAN RECOMMEND WHAT FITS YOUR SPECIFIC NEEDS.

CALL NOW FOR OUR FREE, HIGHLY INFORMATIVE CATALOG OF PC VGA/SVGA, MAC, VIDEO, AND WORKSTATION SOLUTIONS. MOST PRODUCTS CAN BE DELIVERED OVERNIGHT, AND COME WITH A MONEY-BACK GUARANTEE. SO, WHY LOOK ANYWHERE ELSE?

CALL PANELIGHT TODAY!

CALL
PANELIGHT FOR
OUR
FREE CATALOG:
1-800-726-3599

MON.-FRI., 6:30AM-5:30PM P.S.T.
24-HR. FAX: 415-986-3817
E-MAIL: SALES@PANELIGHT.COM
WEB-SITE ADDRESS:
HTTP://WWW.PANELIGHT.COM

PANELIGHT DISPLAY SYSTEMS, INC.,
P.O. Box 190940,
SAN FRANCISCO, CA 94119.
CALL 415-772-3600
OR E-MAIL PANELIGHT@SF.NET



MEMORY

Call 800-610-1216 for Guaranteed Lowest Price*

Simms				Printer Memory			
93 Pin	96 Pin	72 Pin	68 Pin	Model	16MB	32MB	64MB
512x36/32	37/27	37/27	41/28	Epson AL1000, 1300	804	160	---
4 meg	1x36/32	38/28	40/29	HP 10, 11, HP 10D	60	135	---
8 meg	2x36/32	43/34	45/35	HP 351, 4, 44, 45	69	135	---
16 meg	4x36/32	135/109	135/109	HP 1200C, DJ800-750	---	59	190
32 meg	8x36/32	949/929	949/929	HP 4440, 4440, 4440, 4440	---	59	190
64 meg	16x36/32	---	---	HP 4440, 5440, 5440, 5440	---	59	190
30 Pin	100 Pin	80 Pin	70 Pin	HP 4440, 5440, 5440, 5440	---	59	190
569 (3 chip)	84	5	8	HP 4440, 5440, 5440, 5440	---	59	190
160-1mb (3 chip)	15	16	19	HP 4440, 5440, 5440, 5440	---	59	190
160-1mb (3 chip)	15	16	19	HP 4440, 5440, 5440, 5440	---	59	190
4x4-4mb (3 chip)	20	24	28	HP 4440, 5440, 5440, 5440	---	59	190
4x4-4mb (9 chip)	42	43	45	HP 4440, 5440, 5440, 5440	---	59	190

Notebook Memory				Cache Memory			
Model	32	64	128	32	64	128	192
AST (all models)	94	140	250	---	---	---	---
Compaq (most models)	80	140	250	---	---	---	---
IBM (most models)	80	140	250	---	---	---	---
HP (most models)	80	140	250	---	---	---	---
NEC (most models)	80	140	250	---	---	---	---
Philips (most models)	80	140	250	---	---	---	---
Sony (most models)	80	140	250	---	---	---	---
Toshiba (most models)	80	140	250	---	---	---	---

Video Memory				EDO Memory 72 Pin			
Model	32	64	128	Model	32	64	128
ATI (all models)	94	140	250	ATI (all models)	94	140	250
Compaq (most models)	80	140	250	Compaq (most models)	80	140	250
IBM (most models)	80	140	250	IBM (most models)	80	140	250
HP (most models)	80	140	250	HP (most models)	80	140	250
NEC (most models)	80	140	250	NEC (most models)	80	140	250
Philips (most models)	80	140	250	Philips (most models)	80	140	250
Sony (most models)	80	140	250	Sony (most models)	80	140	250
Toshiba (most models)	80	140	250	Toshiba (most models)	80	140	250

Desktop Memory

AST Memory

Model	32	64	128	192
AST Advantage 486/486	12	16	160	350
AST Advantage 486/486	12	16	160	350
AST Advantage 486/486	12	16	160	350
AST Advantage 486/486	12	16	160	350

Compaq Memory

Model	32	64	128	192
Compaq Desktop	30	80	160	350
Compaq Prosignia	30	80	160	350
Compaq Prosignia	30	80	160	350
Compaq Prosignia	30	80	160	350

IBM Memory

Model	32	64	128	192
IBM Address	30	80	160	350
IBM PS/1	30	80	160	350
IBM PS/1	30	80	160	350
IBM PS/2	30	80	160	350

HP Memory

Model	32	64	128	192
HP Dimension	30	80	160	350
HP Dimension	30	80	160	350
HP Dimension	30	80	160	350
HP Dimension	30	80	160	350

NEC Memory

Model	32	64	128	192
NEC Dimension	30	80	160	350
NEC Dimension	30	80	160	350
NEC Dimension	30	80	160	350
NEC Dimension	30	80	160	350

Philips Memory

Model	32	64	128	192
Philips Dimension	30	80	160	350
Philips Dimension	30	80	160	350
Philips Dimension	30	80	160	350
Philips Dimension	30	80	160	350

Sony Memory

Model	32	64	128	192
Sony Dimension	30	80	160	350
Sony Dimension	30	80	160	350
Sony Dimension	30	80	160	350
Sony Dimension	30	80	160	350

Toshiba Memory

Model	32	64	128	192
Toshiba Dimension	30	80	160	350
Toshiba Dimension	30	80	160	350
Toshiba Dimension	30	80	160	350
Toshiba Dimension	30	80	160	350

CIRCLE 752 ON READER SERVICE CARD

THE FINEST PC CIRCUIT BOARDS!!!



the nation's largest full-line PC circuit board specific manufacturer and distributor caters to individuals and businesses interested in only the finest hardware and service at the best price, provided by a long term, financially stable company. For nearly a decade, we at HSB have earned our standing as the most reputable circuit board manufacturer & distributor in the industry. Don't make the mistake of buying 'Throw-Away' circuit boards from a company without any long term commitment to your satisfaction. If we sound like what you are looking for, please give us a call at



(800) 497-0401

FREE SHIPPING...

If you fax your order directly to our distribution center, we will gladly ship your items FREE via Federal Express Economy service anywhere in the contiguous 48 states. Shipments to Alaska or Hawaii will be assessed a minimal handling fee.

You may receive one of our service request forms by simply calling our 24-hour automated service line at (800) 497-0401.

INNOVATIVE PRODUCTS...

- HSB 45ns 72-Pin EDO/FPM Turbo SIMM w/Lifetime Warranty **SCALL**
- HSB 60ns 168-Pin SDRAM Turbo DIMM w/Lifetime Warranty... **SCALL**
- HSB Pentium® Processor-Based, ATX PCI MB, On-Board EIDE, 512KCC, DIMM Socket, AMI PnP BIOS **SCALL**
- HSB Pentium® Pro Processor-Based, ATX PCI MB, On-Board EIDE, 512KCC, AMI PnP FLASH WinBIOS... **SCALL**

CUSTOMER SERVICE...

- ✓ A full 72 hour burn in procedure. We will not ship any board that does not perform flawlessly.
- ✓ A full 3 year warranty on all HSB made circuit boards, which covers 100% of both parts and labor.
- ✓ A limited lifetime warranty is included on all 45ns Turbo SIMM modules and all PGA CPUs.
- ✓ A 60-day money-back guarantee, which ensures that you can't find a better board value.
- ✓ We know you can buy circuit boards for a bit less or a lot more than what you'll pay with us. What you cannot find is faster performance, greater feature lists, or better quality for your money.

[Local] 216-498-1356 [Fax] 216-498-1374, 34208 Aurora Road #297, Cleveland, OH 44139

SIGNAL COMPUTING

Software

Adobe	Lotus	Microsoft	Novell	Parsons	Parsons	Parsons	Parsons
Acrobat	Lotus	Microsoft	Novell	Parsons	Parsons	Parsons	Parsons
Acrobat	Lotus	Microsoft	Novell	Parsons	Parsons	Parsons	Parsons
Acrobat	Lotus	Microsoft	Novell	Parsons	Parsons	Parsons	Parsons

Hardware

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

Printers/Peripherals				Accessories			
Model	Price	Model	Price	Model	Price	Model	Price
Hewlett-Packard		DJ1600C	\$1.275	Color LJ 5	\$5.730		
DJ 340	C2865A	\$319	LJ 5L FS	\$3.910	\$4.90		
DJ 340CM	C2865A	\$329	LJ 5L	C3150A	\$8.05		
DJ 340CV	C2865A	\$329	LJ 5L	C3150A	\$8.05		
DJ 800C	C4547A	\$225	LJ 5L	C3150A	\$8.05		
DJ 800C	C2184A	\$279	LJ 5L	C3150A	\$8.05		
DW 600C	C2184A	\$279	LJ 5L	C3150A	\$8.05		
DJ 800C	C4549A	\$315	LJ 5L	C3150A	\$8.05		
DJ 800C	C4549A	\$315	LJ 5L	C3150A	\$8.05		

Systems

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

Servers

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

Notebooks

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

CIRCLE 753 ON READER SERVICE CARD

STARGATE MICROSYSTEMS, INC.

CPU's

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

MEMORY

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

VIDE CARDS

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

COMPLETE SYSTEMS

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

MOTHERBOARDS

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

CD ROM

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

ACCESSORIES

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

FAX/MODEMS

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

CONTROLLER BOARDS

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

HARD DRIVES

Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price
Model	Price	Model	Price

CIRCLE 754 ON READER SERVICE CARD

PREMIER HARDWARE/BOARDS/COMPONENTS/CHIPS

THESE VALUE PACKED NT OUR COMPETITORS... ON



**New Toshiba
12X CD-ROM
also Available!**

Gas up with the 400 Pro NT Station, with two 200MHz Pentium® Pro Processors for ultimate CPU performance. Tower case. Top-of-the-line 4MB WRAM Matrox® video card, and Professional 17" DiamondTron monitor with .25mm stripe pitch make the perfect combo for absolute killer graphics. Comes pre-loaded with Microsoft® NT and Microsoft Office.



400 Pro NT Station

- **Dual (2) Intel Pentium® Pro 200MHz Processors**
- **U.S.A. Made** Dual Pentium Pro System Board
- Intel 440FX PCIsset, Flash AMI BIOS (APM, PnP)
- 256KB Integrated L2 Cache
- 32MB EDO DRAM
- Universal Serial Bus port, 2 Fast UART16550 Serial Ports and 1 Parallel Port (ECP, EPP)
- 2.5GB EIDE Hard Drive
- 8X EIDE CD-ROM & 3.5" Diskette Drive
- **Matrox 4MB WRAM** PCI Graphic Accelerator
- **Professional PS785 17" DiamondTron NI LR Monitor** 1600x1200 .25mm stripe pitch with On Screen Display
- 33.6 v.34 DSVD Fax/Modem (Internet Ready)
- Full Tower Case w/300W Power Supply
- Microsoft Natural Keyboard & Microsoft Mouse
- Microsoft NT Workstation v.4.0
- Microsoft Office Professional v.7.0
- **Free** Software (Quicken, Presentation & Internet Access)

200MHz \$3,999

With 10 years' service in the personal computer industry, the people at Professional Direct Sales have the experience to back their systems with quality service and support. We are happy to announce custom upgrade configurations are available. All of our systems: 48-hour burn-in and test, operating system and most application software pre-loaded.

Services & Warranties

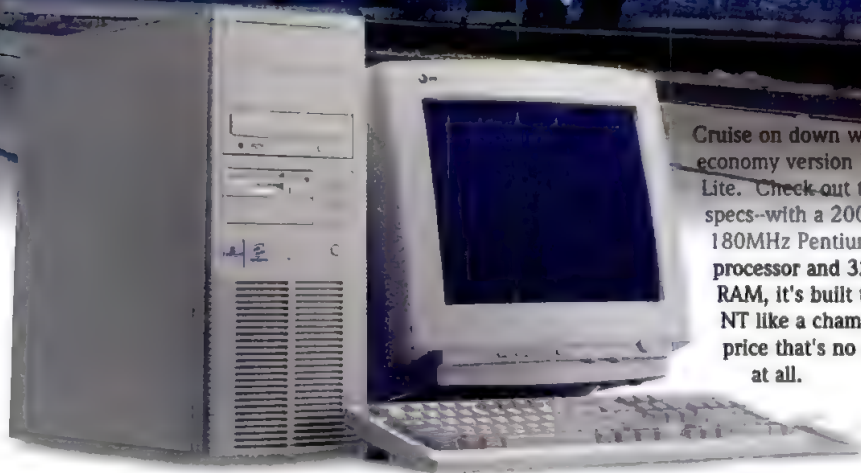
- One year parts & Lifetime labor warranty
- 30-day money back guarantee
- Express parts replacement
- Lifetime toll-free technical support
- Optional on-site service available
- 24 hours BBS service

The Intel Inside, Pentium Processor and Intel Pentium Pro Processor logos are registered trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Original shipping charges and opened software are non-refundable. All returns have to be accompanied with RMA number and must be in resalable condition. System pictured may include some equipment and/or accessories which are not standard features.

SCREAMERS HAVE LEFT THE WRONG ROAD.

Parallel processing is a move in the right direction. And Professional puts you on the right road now. With twin Pentium® Pro technology, USB, 440FX PCIs, EDO RAM, the works. We've got them ready to roll now. At prices that won't slow you down one bit.

Pedal to the metal with the Pro NT Station. Dual IDE connectors, up to 256MB on board, genuine Intel® motherboard, and ATX from factor design to make user upgrades a breeze. Sounds good? Try Yamaha OPL 3 FM synthesis.



Cruise on down with our economy version Pro NT Lite. Check out the specs—with a 200MHz or 180MHz Pentium Pro processor and 32MB RAM, it's built to run NT like a champ at a price that's no contest at all.

Pro NT Station

- Intel Pentium® Pro Processors
- **Intel VS440FX System Board** with Intel 82400FA PCIs, 2MB Flash EEPROM Intel BIOS
- 256KB Integrated L2 Cache
- 32MB EDO DRAM
- Universal Serial Bus port, 2 RS-232C 116550A Serial Ports and 1 Parallel Port (ECP, EPP)
- 2.0GB EIDE Hard Drive
- 8X EIDE CD-ROM & 3.5" Diskette Drive
- PCI 64-bit Video w/MPEG & 2MB EDO RAM
- Professional PS716SL 17" NI LR Monitor .28mm dot pitch
- **Integrate Crystal Audio with Yamaha OPL3 FM Synthesis**
- 33.6 v.34 DSVD Fax/Modem (Internet Ready)
- ATX Tower Case w/250W Power Supply
- 104-Key Keyboard & Microsoft Mouse
- Microsoft NT Workstation v.4.0
- Lotus SmartSuite® 96
- Microsoft Office Professional v.7.0 (Optional)
- **Free** Software (Quicken, Presentation & Internet Access)

180MHz \$2,299
200MHz \$2,519



Pro NT Lite

- Intel Pentium Pro Processors
- Pentium Pro System Board with Intel 82441FX PCIs
- 256KB Integrated L2 Cache
- 32MB EDO DRAM
- 2 RS-232C 116550A Serial Ports and 1 Parallel Port (ECP, EPP)
- 1.6GB EIDE Hard Drive
- 8X EIDE CD-ROM & 3.5" Diskette Drive
- PCI 64-bit Video w/MPEG & 2MB EDO RAM
- AT&T® 15" NI LR Monitor .28mm dot pitch
- 33.6 v.34 DSVD Fax/Modem (Internet Ready)
- ATX Tower Case w/250W Power Supply
- 104-Key Keyboard & PS/2 Hi-Res Mouse (Made by AT&T)
- Microsoft NT Workstation v.4.0
- **Free** Software (Quicken, Presentation & Internet Access)

180MHz \$1,799
200MHz \$2,019



Professional
technologies

800-949-5018

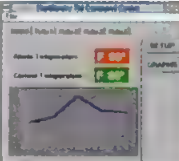
Technical Support Call **800-787-8987**

Internet <http://www.professionalpc.com>

Tel: 909-468-3730 • Fax: 909-468-1372
21038 Commerce Pointe Drive, Walnut,
California 91789
Monday-Friday 7am-7pm
Saturday 10am-3pm P.S.T.

HeatSentry™

The only way to make sure your super-powered PC is properly cooled!



- Make sure your system and CPU are operating at proper temperature.
- Know the exact temperature of your system and CPU at all times.
- Prevent heat-related system crashes.
- Protect your data.
- Protecting your PC's life.
- Be notified automatically of overheating conditions.
- Windows 3.1/95/NT, Novell versions available



CAMELEON TECHNOLOGY, INC.
1-888-858-4321
<http://www.camusa.com>
 816 Charcot Ave., San Jose, CA 95131 Tel: 1-408-321-9860 Fax: 1-408-321-9865
 CIRCLE 755 ON READER SERVICE CARD

jazQub \$449



IceQub

jazQub includes:
 1. Disk 4.0 tools
 SCSI, C50, cable
 Universal power
 Cooling fan
 PC or Mac

Micro Hut
 Telephone (800) 966-0188 . Fax (714) 630-6816
 World Wide Web <http://www.microhut.com>
 Information product@microhut.com
 CIRCLE 757 ON READER SERVICE CARD

CPU'S

AMD K5 (Pentium)
 75Mhz \$60
 90Mhz \$90
 INTEL PENTIUM
 75Mhz \$99
 100Mhz \$139
 120Mhz \$189
 133Mhz \$249
 150Mhz \$349
 166Mhz \$429
 200Mhz \$695
 INTEL PENTIUM PRO
 200Mhz \$695

SEE OUR ADS IN:

COMPUTER SHOPPER
 PC WEEK & NET BUYER
MICRO ASSIST



CALL: 800-333-7373
 OR FAX: 732-423-7373

CUSTOMER SALES HOURS
 Mon-Fri: 9am-7pm
 Sat: 10am-5pm EST

MEMORY

1X32 \$29 1X32 \$29
 2X32 \$59 2X32 \$55
 4X32 \$109 4X32 \$109
 8X32 \$215 8X32 \$219

HARD DRIVES

MOTHERBOARDS

SYSTEMS

NOTEBOOKS

MULTIMEDIA

NETWORKING

INTERNET

(201) 459-0233 / Fax: (201) 459-0263 50 Harrison St. / Hoboken NJ 07030
 CIRCLE 756 ON READER SERVICE CARD

PCMP PORTABLE COMPUTERS

COMPACT & PORTABLE

ISA SLOT

1865
 2200
 2700



OX4-100, #10 HDD, FDD, ISA SLOT,
 4MB RAM, PCMCIA(2), BATTERY

Call Toll Free
 1-800-818-2819

Available

800 x 400 TFT display / 2MB PC Video
 10.4" 640 High Color
 6K CD-ROM
 1.6G HDD
 6MB RAM
 1.4MOP
 28.8 Fax/Modem
 Windows 3.1
 Diagnostic
 16" W x 9" H x 1.5" D
 23.8 lbs Only
 OEM, Dealers, Vendors, Gov't.,
 Corporations Welcome!
 OEMS 800-818-2819
 5000 Commerce Center, Fort Lee,
 Penn. 19034, 19034, 19034

800-866-1237

CIRCLE 758 ON READER SERVICE CARD

The most Competitively Priced, Easy to Use PC Cards available on the Market today.



Modems
 Sound Cards
 CD-ROMs
 and more...

Featuring:
 28.8kbps Cellular Ready PC Card Fax/Modem
 33.6kbps Cellular Ready PC Card Fax/Modem
 and 6X Portable PC Card CD-ROM

Technology Made Simple,
 Performance Made Affordable.
 Any questions?

Ziffer Labs Inc.

1-800-OK-EIGER

CIRCLE 759 ON READER SERVICE CARD

REPRINTS

A Great Review is Worth Repeating

Almost nothing influences buyers in the computer market as much as a great product review, particularly one in PC Magazine. That's because reviews are so essential to buyers when they're making product choices. A customized reprint of your review will have far more influence on sales than any other sales literature. Call Ziff-Davis Reprints at 800-825-4237.



TOSHIBA
DISCOUNT PRICES

WE'RE THE SYSTEMS AND PERIPHERALS EXPERTS. WE'VE GOT IT ALL! IF YOU DON'T SEE IT HERE, GIVE US A CALL!

EST. 1983

HARD DRIVES

Seagate

ST3851A - 850mg, ATA, 3600rpm	\$189
ST51080A - 1.08mg, ATA, 12ms	\$199
ST51080A - 1.08mg, SCSI, 12ms	\$259
ST31275A - 1.2mg, FATA, 3600rpm	\$210
ST31621A - 1.6mg, FATA, 14ms	\$235
ST32430N - 2.1G, FSCSI, 9ms	\$529

Western Digital

Cavlar AC3100C - 1.0MG, FATA, 10ms	\$188
Cavlar AC31200 - 1.2G, FATA, 10ms	\$209
Cavlar AC31600 - 1.6G, FATA, 10ms	\$225
Cavlar 2100RTL - 2.1G FATA, 12ms	\$305
Cavlar 2100RTL - 2.1G, FSCSI, 12ms	\$339

Quantum

Trailblazer - 850mg, FATA2, 14ms	\$189
Fireball - 1.2G, FATA2, 12ms	\$219
Sirocco - 1.7G, FATA, 12ms	\$269
Sirocco - 2.6G, FATA, 12ms	\$375

Maxtor

71336A - 1.3G, FATA, 12ms	\$189
71626A - 1.6G, FATA, 12ms	\$219
72084A - 2.1G, FATA, 12ms	\$265

HIGH PERFORMANCE HD

Quantum

Atlas - 2.1G, FSCSI, 8ms, 7200, 1024k	\$479
Atlas - 2.1G, FSCSI, 8ms, 7200, 1024k	\$499
Atlas - 4.3G, FSCSI, 8ms, 7200, 2048k	\$699
Atlas - 4.3G, FSCSI, 8ms, 7200, 2048k	\$899

Seagate

Barracuda 2-2.1G, FSCSI, 7200, 1024k	\$709
Barracuda 2-2.1G, FSCSI, 7200, 1024k	\$749
Barracuda 4-4.3G, FSCSI, 7200, 1024k	\$1099
Barracuda 4-4.3G, FSCSI, 7200, 1024k	\$1199

MONITORS

Sony

Multiscan 15ex Trinitron Display	\$389
Multiscan 15el II Trinitron Display	\$459
Multiscan 17el II Trinitron Display	\$789
Multiscan 20el II Trinitron Display	\$1,649

NEC

MultiSync M500 25 dpi 1280x1024	\$519
MultiSync M700 25 dpi 1280x1024	\$849
MultiSync XV15+ 15"	\$485
MultiSync XV17+ 17"	\$795
MultiSync XE21 21"	\$1,679

Mag Innovation

DX1595 - 15" 28, 1280 x 1024 flat	\$359
DX1795 - 17" 28, 1280 x 1024 flat	\$619

REMOVABLE HD

Iomega

Zip Drive - 100mg, incl. cartridge	\$189
Jaz Drive - 1gig, incl. cartridge	\$489
100mg Zip media	\$19
1 Gig Jaz media	\$119

Syquest

EZ 135 - 135mg, incl. cartridge	\$119
135mg EZ media	\$20

We also stock MO drives and cartridges from Fujitsu, Pinnacle Micro, and Olympus

NOTEBOOKS

We Are TOSHIBA Specialists

T110CS - P100, 8/8/10, 11.3" DS	\$2239
T110CT - P100, 8/8/10, 11.3" TFT	\$2679
T420CDS - P100, 8/8/10, 6x, 11.3" DS	\$2899
T420COT - P100, 8/8/10, 6x, 11.3" TFT	\$3739
T500CS - P120, 16/1/2G, 12.1" DS	\$3789
T500COT - P120, 16/1/2G, 12.1" TFT	\$4729

JUST MEDIA READY - WOW

T650CT - P133, 16/1/2G, 11.3" TFT	\$4399
800X600 NEW PC/AT HOUSE	
T720COT - P133, 16/1/2G, 12.1" TFT	\$6299
6x 28.8K WE HAVE A STOCK	

Hitachi

C100T - P100, 8/7/20, 28.8K, 10.4" TFT	\$2999
C120T - P120, 8/1/0G, 28.8K, 11.8" TFT	\$3899
M100T - P100, 8/7/20, 4x, 28.8K, 10.4" TFT	\$3299
M120T - P120, 16/1/0G, 4x, 28.8K, 11.8" TFT	\$4649
M133T - P133, 16/1/0G, 6x, 28.8K, 11.8" TFT	\$5099

IBM

Thinkpad 560 P100, 8/8/10, 11.3" DS	\$2599
Thinkpad 760ED P133, 16/1/2G, 12.1" TFT	\$6549

PC SYSTEMS

Extensa

Extensa 510 P100, 8/8/10, 10.4" DS	\$1959
Extensa 570COT P75, 8/8/10, 4x, 10.4" TFT	\$3399

Compaq

Armada 1120 P100, 8/8/10, 10.4" DS	\$1929
Armada 4120 P120, 16/1/0G, 11.3" DS	\$2959

Digital (Hinode)

YP LTS 5120 - P120, 8/1/0G, 11.3" TFT	\$2759
Ultra II - P100, 8/1/0G, 10.4" TFT	\$3599
Ultra II - P133, 8/1/4G, 10.4" TFT	\$4199

MEMORY

Main Brand

1 x 32 72pin 70ns 4meg	\$39
2 x 32 72pin 70ns 8meg	\$65
4 x 32 72pin 70ns 16meg	\$129
8 x 32 72pin 70ns 32meg	\$259
16 x 32 72pin 70ns 64meg	CALL

EDO

1 x 32 72pin 70ns 4meg	\$45
2 x 32 72pin 70ns 8meg	\$70
4 x 32 72pin 70ns 16meg	\$135
8 x 32 72pin 70ns 32meg	\$269
16 x 32 72pin 70ns 64meg	EDO CALL

TAPE BACKUPS

HP Colorado

T1000 Internal (Travan)	\$149
T1000E External (Travan)	\$185
Jumpstart 7400 Internal	\$199
PowerTape Internal 2.4GB drive	\$839
PowerTape Internal 4.0GB drive	\$999

PRINTERS

Hewlett Packard

DeskJet 680C 600dpi, 5ppm, 512kb	\$299
DeskJet 820C/CI 600dpi, 6ppm	\$375
DeskJet 855C/CI 600dpi, 7ppm	\$465
LaserJet 5P 600dpi, 4ppm, 1MB	\$469
LaserJet 5P 600dpi, 5ppm, 2MB	\$835
LaserJet 5 300dpi, 10ppm, 20MB	\$1249
LaserJet 4V 600dpi, 16ppm, 4MB	\$1805
LaserJet SSI 600dpi, 24ppm, 4MB	\$2645

CD ROM/AUDIO/VIDEO

Creative Labs

Sound Blaster 16 Value PnP	\$75
Sound Blaster 32 PnP	\$149
Sound Blaster AWE 32 PnP	\$225
Sound Blaster Value CD 4x kit	\$225
Sound Blaster Discovery CD 4x PnP	\$339
Sound Blaster Performance 64 PnP	\$395

Kodak

DC-20 Digital Camera	\$299
DC-40 Digital Camera	\$629
DC-50 Digital Camera Zoom Lens	\$869

NEC/Teac/Toshiba

NEC 6x Internal IDE	\$79
Teac 6x Internal IDE	\$110
Toshiba 6x Internal IDE (5522)	\$89
Toshiba 6x Internal IDE (5602)	\$110
Toshiba 6x Internal SCSI (3701)	\$239

VIDEO CARDS

Diamond

2001 Video w/ MPEG Shw. 2MB	\$129
SpeedStar 64 video 2120 1MB	\$119
Stealth 64 video 3240XL 2MB	\$299

ATI

WinBoost VLB 2MB	\$145
WinBoost PCI 2MB	\$129

Matrox

Milenium w/ 2MB W-RAM	\$279
Milenium w/ 4MB W-RAM PCI	\$395

PC SYSTEMS DESIGN

3040 Saturn Street
Brea, CA 92821
Tel: 714-572-8292
Fax: 714-572-8051

800-833-0128
We Welcome Govt./Educ. RO's!

All products carry their respective manufacturer's warranty. Product information, availability, and prices are subject to change without notice. Prices reflect a 5% cash discount. All trademarks are registered with their respective companies. All returns must be accompanied by an RMA. No cancellations or special order items. Non-defective items returned will be assessed a 25% restocking fee. PC Systems Design is not responsible for any typographical errors. © 1995 Compaq Computer Corporation.

CIRCLE 760 ON READER SERVICE CARD

Lose 500 pounds in 10 minutes

with a Rose keyboard monitor switch

Streamline your computer room by reducing excess equipment. Access up to 256 CPU's from a single keyboard, monitor, and mouse. ServeView is our best-selling switch, has every feature you can imagine, and installs in minutes. Compare price, features, performance, quality, and support and you'll find Rose can't be beat.

Call today for free catalog

- ◆ Print servers
- ◆ Data switches
- ◆ Keyboard/video control

800-333-9343

Sept. 23-25 Tech & Learning - Dallas, TX Booth #B02
Oct. 29-31 Networks Expo - Dallas, TX Booth#1579
P.O. Box 742571 ◆ HOUSTON, TEXAS 77274
TEL 713/933-7673 ◆ FAX 713/933-0044

Call us to discuss your application or to receive your free information kit.

ROSE ELECTRONICS

CIRCLE 761 ON READER SERVICE CARD

Control PC, Macintosh, and Sun Computers from 1 Console!

- Supports any mixture of PC/Macintosh computers and Sun workstations - up to 4 in all
- Convenient desktop size
- Any platform's peripherals work with any type of computer in the system
- Full multimedia capabilities; keyboard, mouse, video, microphone, speakers, and serial support available
- Multiple users can access different computers simultaneously

AUTOBOOT
COMMANDER 1XP™



PC is a registered trademark of International Business Machines Corporation. Macintosh is a registered trademark of Apple Computer, Inc. Sun is a trademark of Sun Microsystems. The Inc. 500 logo is a registered trademark of Goldhirsch Group. Cybex, Commander, AutoBoot, and 1xP are trademarks of Cybex Computer Products Corporation.

Cybex Computer Products Corporation
4912 Research Drive Huntsville AL 35805 USA
1-800-932-9239 (205) 430-4030 fax
<http://www.cybex.com>



SEE US AT NETWORKS EXPO
DALLAS, OCT. 29 - 31
BOOTH #1591

SEE US AT COMDEX FALL 96
LAS VEGAS, NOV 18 - 22
BOOTH # L42542



CIRCLE 768 ON READER SERVICE CARD

Watch the Action on Your Desktop

High Quality TV Tuner/FM Radio Card for the PC



The TVR-202 TV & FM Radio Card turns your PC into a full-fledged multi-media center. The TVR-202 is a TV Tuner, FM Radio & Single Frame Video Capture Card. Whether you are a multi-media professional or just looking to enhance your PC capabilities the TVR-202 has got what you are looking for. **TVR-202** provides the sharpest and brightest high resolution TV images and clear Radio with ceramic filters to enhance reception

- Channel surf and surf the Net simultaneously*
- Watch TV/Listen to radio while running any Windows application
- Capture high-resolution still images from TV or any video source
- Size and scale the TV/Video display window to any size
- Intelligent event scheduler automatically launches TV/Radio shows
- Simple point and click interface
- Easy to install, no pesky jumpers or IRQ settings

\$220.00
or less



Call **800-882-8184**

for the name of the reseller nearest you or visit our website at:
www.aitech.com or email: **sales@aitch.com**



ELEK-TEK

Fry's

MICRO CENTER

NCA

ULTIMATE

AItech

Vision for Multimedia
www.aitech.com

©1996 AItech International Corp. All marks and logos are trademarks or registered trademarks of their respective owners. *NOTE-modem browser and internet service account required. Please contact your local reseller for availability of products. Call AItech for standards compliance. Specifications are subject to change without notice.

CIRCLE 769 ON READER SERVICE CARD



**GO DIRECTLY TO
THE SOURCE FOR
THE LOWEST
PRICES AND THE
BEST SERVICE.**

Boxlight is the leader in electronic presentation equipment. Boxlight has more than 50 models available when you call, and our presentation experts will help you choose the right one. Plus, we offer a 30-day money-back guarantee and free lifetime tech support.



PROCOLOR 3080+

Call For Price

- 350 lumens 16.9 lbs.
- 640 x 480 (800 x 600 COMPRESSED)



Presenting A Better Way.™

Your Direct Connection To Successful Presentations



BEACON 2500

\$6499 Business Lease*
\$199/Month

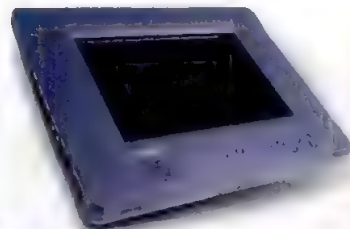
- 500 lumens 28 lbs.
- 640 x 480



PROCOLOR 2001

\$4999 Business Lease*
\$149/Month

- 250 lumens 16 lbs.
- 640 x 480 (800 x 600 COMPRESSED)



PROCOLOR 1820

\$2499 Business Lease*
\$79/Month

- LCD 10.4" diagonal 5.5 lbs.
- 640 x 480



REVOLUTION

\$6499 Business Lease*
\$199/Month

- 280 lumens 13.8 lbs.
- True 800 x 600

*Business Lease is a 36 month FMV lease requiring first and last month's payments at lease inception. Price does not include sales tax. Call for complete details.

Government: (800) 497-4009
Resellers: (800) 736-6956
International: (360) 779-7901
Rental: (800) 736-6954
Fax: (360) 779-3299
Education: (800) 689-6676
<http://www.boxlight.com>

**TO ORDER, CALL
1 800 762 5757**



Monday - Friday, 8am - 5pm PST. Purchase orders accepted.
Prices subject to change. Quantities may be limited to stock on hand.

Intel Pentium® Pro Processor based PC's from **BOLData**

- Our Pentium® Pro processor-based systems feature Intel advanced/VS ATX motherboard
- 1 Year Depot Warranty
- Name Brand Components

Other Boldata Products:

- ▶ Full line of memory - Fast Page - EDO - SRAM - Cache
- ▶ Brand name add-on products from manufacturers such as Mitsumi, TEAC, Western Digital, Diamond, Trident, Creative Lab, and more

Call Boldata To Order Today!!!

We welcome government, educational and corporate purchase orders!

**Systems Shipped Within
48 Hours of Order.**

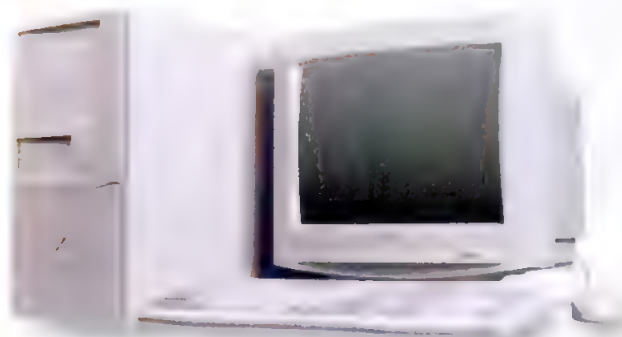
Call 1-800-923-BOLD

For a free catalog

BOLData™
S Y S T E M S

Adventure Pro-200 System

- Intel Pentium® Pro 200 MHz Processor w/256k L2 Cache
- 32MB EDO Memory
- ATX Mid Tower Case w.230 Watt Power Supply
- System features Intel Advanced/VS ATX motherboard
- On board IDE/IO - 440FX Intel chip set
- Socket 8 - support to 200MHz
- 4 PCI- 3 ISA slots
- Teac 1.44 floppy
- Western Digital 2.5 IDE Hard Drive
- Mitsumi 104 keyboard
- Fully assembled, tested, burned in and boxed.
- Price **\$1589**



All other configuration available at best price!

Prices and specifications subject to change without notice. © 1996 BOLData SYSTEMS. The Intel logo and Pentium logo are trademarks of Intel Corporation. All other trademarks are the property of their respective owners.

Proven LCD Projection Solutions

Super Low Blowout Pricing

InFocus LitePro 580 LCD Projectors*



*Original
List Price
\$9,999

\$5,495

- LitePro 580 is a complete, VERY portable, multimedia presentation solution
- 30-40% brighter than conventional active matrix LCD projectors - "use it with the lights on"
- Integrated full-motion video with stereo sound system
- Compact, lightweight design, comparable in size to a 35mm slide projector, weighing just 16.9 lbs
- Bright, long-life 150-watt metal halide lamp

*Projectors are factory refurbished and backed by a FULL 1-Year Factory Warranty. Call for further details!

Access the LCD Presentation Experts Today!

800-419-0023

508-358-0077

ADTECH
YOU'LL NEVER LOOK BETTER

MAINTENANCE = SERVICE = IMPROVEMENT

Million Dollar In-Stock Inventory for Immediate Next-Day Delivery
7-Day Money-Back Guarantee

Hop on the Internet and consult our LCD Wizard to help further define your LCD projection needs.

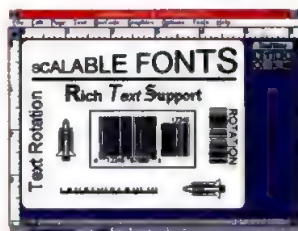
<http://www.adtech-sys.com>

CIRCLE 765 ON READER SERVICE CARD

The Next Generation in Label Design Software

LabelWorks™

for Windows



LabelWorks sets the new performance standard for professional quality label design. No other program combines such easy operation with this much power!

- Provides Desktop Publishing features to enhance label design. Features include: WYSIWYG, rulers, guides, page zooms, lines, shapes.
- Rich text support allows you to edit font styles, types, and sizes within the same line.
- Supports all major Bar Code symbologies, including Code 39, 93, 128, POSTNET, UPC, Bookland EAN, 19 types in all.
- Imports & Exports using TIFF, GIF, BMP, PCX, WPG, WMF, TARGA graphic files.
- Rotates Text, Bar Codes and imported graphics in 90 degree increments.
- Prints labels on virtually any windows supported printer.
- Prints labels directly from dBase, DIF & ASCII files.

Dealer Inquiries Welcome.

Call for Free DEMO Software

AMERICAN MICROSYSTEMS
2190 Regal Parkway, Euless, TX 76040

(800) 648-4452 (817) 571-9015 FAX (817) 685-6232

"Boxlight is your reliable source
for electronic presentation rentals!"



Whether you need multimedia, high-resolution, incredible brightness or lightweight portability, we've got the right tools to make your bright ideas shine!

Rental fee applies towards purchase of ANY system within 30 days
Convenient "Label & Leave" Pick-up Service
Every system tested for Guaranteed Performance!

Call Today and
Project Tomorrow!

1-800-736-6954

BOXLIGHT
CORPORATION

CIRCLE 786 ON READER SERVICE CARD

It's true.

With the new **Galaxy V470** from Chisholm, you really can project brilliant

images from your PC or Macintosh, even with the room lights on. Thanks to its 470 lumen image, your audience can now take notes, follow your written materials, and do anything else that requires decent light.

The **Galaxy V470** also happens to come with a built-in speaker, dual video inputs, four audio channel inputs, power zoom and focus, and rear projection capabilities. Yet it weighs just 31 lbs.

Chisholm products have been the top choice of business and education professionals for years. And if quality like this can stand up to high school students, just think how long it'll last you. For more information, call our toll-free number today.



CHISHOLM

910 Campisi Way • Campbell, California 95008-2340
(408) 559-1111 • FAX (408) 559-0444

1-800-888-4210

CIRCLE 767 ON READER SERVICE CARD

INPUT/DATA/ACQUISITION/BARCODE/POS

PREMIER

SVGA DLP + JBL WOW

Fully loaded and powerfully easy to use, In Focus' new LitePro® 620 multimedia projector features Texas Instruments' Digital Light Processing™ and 800 x 600 resolution for exceptionally smooth, film-quality images from all computer and video applications. Powerful JBL speakers complete the picture with world-class audio unmatched by any other projector! Call for a free brochure.

Ask for our free catalogs!



1 (800) 480-4884

<http://www.minnwest.com>

Est. 1973 • All Major Brands • Sales • Service • Rentals • GSA

CIRCLE 770 ON READER SERVICE CARD

ONE STOP SHOPPING

Everything you need for backup is at GigaTrend

- Auto, manual, DLT libraries, multi-drive configurations
- Novell NetWare, Windows NT/95, UNIX, AS/400
- Leading enterprise backup and disaster recovery software
- Responsive technical support by factory-trained personnel
- Competitive pricing



One Call is All It Takes!
800-743-4442

Tel: 619-931-9122
Fax: 619-931-0846
e-mail: backup@gigatrend.com
<http://www.gigatrend.com>

**GIGA
TREND**

Backing Up The World™

CIRCLE 774 ON READER SERVICE CARD

DOS • WINDOWS • 95 • NT • OS/2 • UNIX



East-800-828-0599

West-800-928-9099

Headquarters—Chi Corporation
30275 Bainbridge Rd, Suite 2A
Solon, OH 44139
216 349 8605 Fax 216 349 8609

Phoenix Office—Chi Corporation
10640 North 28th Dr., Bldg. C205 Suite 21
Phoenix, AZ 85029
602 548 9010 Fax 602 548 9041

Nine Track Tape Systems

All Densities—800/1600/3200/6250

All Platforms

3480/3490/3490E

Single Load or 10 or 60
cartridge Libraries

DLT—4mm—8mm

Complete Network backup

Solutions—Novell, NT, Unix

Data Conversion Services

4mm, 8mm, 9trk, 3480, 3490,
3490E, EVEN TO CD

Disk RAID Systems

3GB up to 250 GB

All Platforms

CD ROM Recorders

2x/4x, 4x/4x, 6x/6x—All platforms

Chi Corporation: Manufacturers of the
Award Winning OutRight and ReelView II Software

CD ROM Jukebox

For Novell or NT Software by Smart Storage

CHI 2801

28 Disk capacity with 4—4x CD ROM Readers
Plus 1 Yamaha CDR100 4x/4x Recorder/Reader
Includes all necessary software, cables, SCSI card

CHI 2100

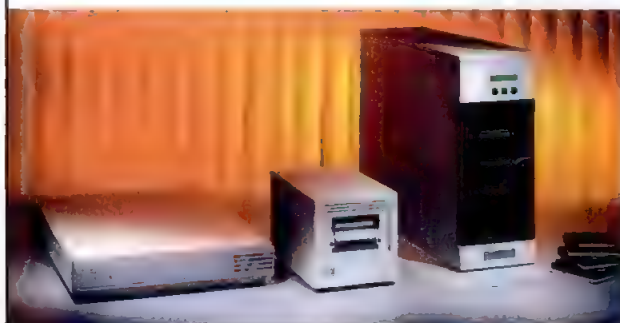
21 Disk capacity with 3—4x CD ROM Readers
Includes all necessary software, cables, SCSI card



PC • RS6000 • AS400 • HP • SGI • SUN • DEC

CIRCLE 773 ON READER SERVICE CARD

SPEED. CAPACITY. CONNECTIVITY.



AND DID WE MENTION RELIABILITY?

- **DLT** - Award-winning, high-capacity, high-performance tape drives & libraries
Store 15 GB - 400 GB system
Backup up to 5 GB/hr
- **Half-inch cartridge** high-performance IBM compatible solutions

Call today for the most cost-effective data storage solutions available

**1-800-729-8725 or
619-571-5555**

<http://www.overlanddata.com>

Exclusive 18 & 36-track read and write in one drive
10 GB/hr transfer rates

- **9-track interchange** systems for fast, dependable mainframe to PC data interchange



**OVERLAND
DATA**

DRIVING THE INDUSTRY

CIRCLE 777 ON READER SERVICE CARD

Free Disc Archive 95

Backup Utility with Purchase of an RCD-1000 CD-R/W

2X 2X

RCD-1000

\$599



2X Recorder/2X Player - External (PC/Mac); includes hardware & software

2X 4X

Explorer

CD RECORDER

2X Recorder/4X Player - Internal only (PC); includes cabling & software

\$599



Recordable CD Media
74 minute - 650 MB
\$9.99



FACTORY DIRECT OUTLET

PINNACLE MICRO

THE OPTICAL STORAGE COMPANY

Call & Order Direct Toll Free **800-726-3030**
Phone: 714-789-3111 • Fax: 714-789-3136

Special Promotion: Product may consist of manufacturer's/wholesaler's components as new or 80% off. Full 90 day limited warranty. All sales are final. No returns. Limited stock available. Please. Retail do not include sales tax or shipping and handling.

CIRCLE 771 ON READER SERVICE CARD

MAC	SUN	UNIX	DOS	WINDOWS	AIX	OS2
Your Tape Connection Source						
✓ Mainframe ↔ PC ✓ Tape ↔ CD ✓ Data Exchange/Backup ✓ Data Conversion TAR, CPD, VMS, SAVES, ASCII, EBCDIC ✓ 1 year Onsite Warranty						
Featuring FUJITSU Quality Products						
(800) CPU-3480						
Computer Peripherals Unlimited Inc. 2355 N. Steves Blvd., Suite C • Flagstaff, AZ 86004 (602) 671-1225 Phone • (602) 671-1237 Fax						
3480 3490 3490E 9-Track 8mm 4mm						

CIRCLE 778 ON READER SERVICE CARD

9 TRACK/3480/3490/3490e

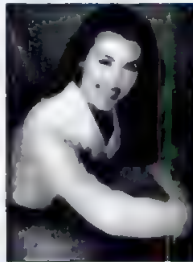
WINDOWS DOS NT NOVELL OS2

9 Track only \$995 3480 only \$4995

IBM ANSI UNIS Tar VMS Unlabeled
Conversion EBCDIC TO ASCII
Tape Backup, Duplication
Tape to CDROM
Service with a Smile

LAGUNA DATA SYSTEMS

800-938-TAPE (702) 382-3964 Fax



CIRCLE 780 ON READER SERVICE CARD

Custom Fast 20 SCSI Tools

SCSIVue™ Active Terminator

Benefits:

- Improves SCSI Bus Performance
- Less Errors; More Reliable Data Transfer
- Diagnoses Problems • Analyzes Signal Quality

\$59

SCSIVue™ Gold Diagnostic Cables

Benefits:

- No Loss Of Important Data
- Faster Performance
- Test Cable Integrity

\$39

SCSIVue™ 2-1 Active SCSI Switch

Benefits:

- Share Devices Between 2 Computers
- Up to 14 Devices to 1 Computer

Features:

- 2-1 Active Digital Switch/Repeater
- Regenerates SCSI Signal for Long Runs

SCSIVue™ Custom Internal Cables

Benefits:

- Less Errors, Ultimate Performance
- Silver Wire Improves Signal Quality

Features:

- Perfect 90 Ohm Impedance Match • Custom in 1 Day
- Triple Pronged Connector With Gold contacts Silver Wire

\$89

Granite

CIRCLE 779 ON READER SERVICE CARD

Tape Solutions

...The Tape Experts

• **9 TRACK**

• **3480 • 3490 • 3490E**

• **LIBRARIES**

Qualstar Corporation
6709 Independence Avenue
Canoga Park, CA 91303

FAX (818) 592-0116 TEL (818) 592-0061
(800) 468-0680



CIRCLE 781 ON READER SERVICE CARD

TRANSFORM YOUR CD-ROM INTO A PARALLEL PORTABLE \$89



- ▲ Quick and simple installation
- ▲ Works with IDE/ATAPI drives
- ▲ Perfect upgrade for any PC

- ▲ Works with standard and high-speed EPP Printer ports
- ▲ Complete kit: Everything you need, just add the drive

IDE/PP CD Drive Transformer \$89



DEALER & VOLUME DISCOUNTS CALL

1-800-873-VALU (8258)

16098 Regatta Lane • San Jose, CA 95112 Ph. 408-437-9300 Fax 408-437-9333

CIRCLE 762 ON READER SERVICE CARD

"1996 GAMER & AUDIOPHILE WINNER"

Available Direct From Multimedia Labs Inc.

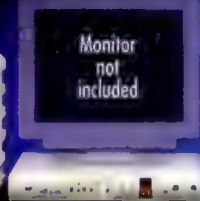
Phone Direct 1-800-484-5159 + Labs (Pin #)

Only \$199.95

Model TC 1490-1510/8

True High Fidelity Sound For Your Computer System at 40 watts RMS per Channel.

EDITORS' CHOICE January 1996



Monitor not included



Multimedia Labs Inc. • 430 Main Street • Baltimore, MD 21136 • Media Labs@AOL.com

CIRCLE 783 ON READER SERVICE CARD

TAKE CONTROL OF 2 to 64 SERVERS

FROM ONE KEYBOARD, MONITOR AND MOUSE

- Any mix of PCs; Mac & Sun

- Keyboard/mouse emulation

- AUTOSCAN

- Front panel & Hot-key operation

- Remote access to 150'

- Desktop or rack mount

- Over 50,000 in operation



MasterConsole®

Rock solid, reliable control



CALL TODAY! 800-RCI 8090 Ext 41

NETWORKS EXPO 10/29-10/31 BOOTH #1956

DISTRIBUTORS LOCATED WORLDWIDE

RCI Europe (31) -10-458-6673
fax (31) -10-451-9610

RCI Taiwan (886)-2-218-1117
fax (886)-2-218-1221

Raritan Computer, Inc. (908)874-4072 FAX (908) 874-5274

10-1 Ilene Court, Belle Mead, NJ 08502 ■ sales@raritan.com ■ http://www.raritan.com

30-DAY MONEY BACK GUARANTEE FULL 1-YEAR WARRANTY

CIRCLE 785 ON READER SERVICE CARD

BSDI-THE INTERNET EXPERTS' CHOICE

ALL-IN-ONE INTERNET AND WEB SERVER SOFTWARE

Internet experts can tell you BSDI-powered PC servers **OUTPERFORM WORKSTATION PLATFORMS** that cost thousands more. Tell you a BSDI Web server can **HANDLE MILLIONS OF HITS** per day and saturate several T1 lines. Tell you BSDI server software comes ready to run your **WEB, E-MAIL, FTP, NETNEWS**, and other Internet and intranet services. Tell you BSDI products are built and supported by the **TECHNOLOGISTS WHO KNOW HOW TO MAKE THE INTERNET WORK**. And, if you're interested in hearing about top performance and exceptional reliability instead of vendor promises and industry hype, they can tell you why BSDI is **A BETTER CHOICE THAN NT, SUN, OR SGI**. You can use BSDI's Internet-ready system software as a **HIGH-TRAFFIC WEB SERVER** for PCs, **A POWERFUL GATEWAY TO CONNECT NOVELL NETWORKS** to an enterprise Internet or intranet, or a **ROCK-SOLID PLATFORM FOR ADVANCED INTERNET AND WEB APPLICATIONS**. The only thing even the Internet experts can't tell you is why you've waited until now to try BSDI!

IT'S TIME TO TRY BSDI
CALL 1-800-248-7273
FAX 1-719-598-4238
E-MAIL info@bsdi.com
HTTP://www.bsdi.com



BURKELEY SOFTWARE DESIGN, INC.
Powering the Networked Economy™

This product is a service mark of the Berkeley Software Design, Inc. and its contributors. BSDI is a registered trademark of Berkeley Software Design, Inc. All rights reserved.

CIRCLE 784 ON READER SERVICE CARD



"We can put about twice as many outbound Netnews feeds on a BSDI 90 MHz Pentium than on an equivalent Sun system. There are clear reasons to go with BSDI on PCs."

— Kurt Lidl
Manager of New Product Development
UUNET Technologies

"A single Pentium PC running the Apache-BSDI combo routinely handles millions of hits per day, yet consumes less than half of the CPU's capacity."

— Steven Jenkins
Webmaster
www.windows95.com

"BSDI has integrated the tools and utilities that represent the ultimate Internet operating system."

— Peter Hakanson
TCP/IP Manager
Volvo

"We've had BSDI-based machines with uptimes of nine months or more with very heavy use. Even BSDI 486/66 systems can handle 150 or more users."

— Mike Dickson
Lead Software Engineer
CompuServe

MODULAR COMPUTER RACKS

- STANDARD PARTS
- CUSTOM-DESIGNED
- SPACE-SAVING
- EXCHANGEABLE
- EASY TO USE

321 Fifth Avenue
New York, NY 10016
TEL: (212) 694-4400
FAX: (212) 694-6853

Call 1-800-434-3746

© MEMPHIS Equipment Support Systems, Inc.

CIRCLE 786 ON READER SERVICE CARD

INKJET REFILLS

\$2.98
Bottle
XIJC32

REMOVABLE HARD DRIVE RACK
XMFMR IDG **\$18.95**

SIMM CONVERTER
IESCA or IESCD 1.85" High
\$14.95

InkJet Refill
XIJC32 Canon BC01/02
Twin Pack \$5.95
XIJH33 HP 5162 6A
Twin Pack \$9.49
XIRC18 Canon BJC600
Blk Cartridge \$3.49
XIRE07 Epson Stylus
Color II Blk \$10.49

**WE CARRY ACCESSORIES,
CABLES, FURNITURE,
MULTIMEDIA & NETWORK
PRODUCTS
FOR FREE CATALOG CALL
408.730.0673
<http://www.computergate.com>**

Computer Gate
INTERNATIONAL

CIRCLE 787 ON READER SERVICE CARD

RETURN

“Our ROI is higher with PC Magazine Marketplace advertising.”

PUT YOUR AD HERE AND WRITE YOUR OWN PC MAGAZINE SUCCESS STORY. START ADVERTISING NOW! CALL 800-825-4237 TODAY!

— Kelly Leopard
Principal
Total Recall, Inc.

DIGITAL CAMERAS
FROM \$299

Since 1988, Dycam's only business has been Digital Cameras. Today, we offer a full range of Grayscale and Color models. Call a Dycam expert to help you select the best Digital Camera for your application.

Model 10-C includes:
Power Zoom with macro
Auto Focus & Flash
Unlimited Storage
Accepts Close-up and Wide-Angle Lens Adapters
Exclusive Dycam Operating Software

EDITORS' CHOICE

**NOT AVAILABLE IN RETAIL STORES. CALL DYCAM DIRECT AT:
1-800-88-DYCAM**
PHONE: (818) 407-3980 • FAX: (818) 407-3988
VISIT OUR WEB SITE: <http://www.dycam.com>

DYCAM—THE DIGITAL CAMERA COMPANY
CAMERAS • SYSTEMS • SOFTWARE • SUPPORT

AMERICAN EXPRESS EXCHANGE TRAVEL CARD

CIRCLE 788 ON READER SERVICE CARD

Wireless Printing

NEW! Go Print

Share Printers Without Wires or a Network

- ▲ Up to 8 printers can be used by any number of PC's.
- ▲ Prints 200 to 500 feet indoors-through walls
- ▲ Works with any 100% IBM compatible PC and printer.
- ▲ No additional software or cards.

30 DAY MONEY BACK GUARANTEE

800-492-2320

AeroComm, Inc. 13228 W 90th, Lenexa, KS 66215

CIRCLE 789 ON READER SERVICE CARD

STOP Production Dust From Getting Into Your Computer Equipment

The **DUSTSHIELD** is used by hundreds of companies to prevent the damage and downtime that occurs when airborne contaminants get into computer equipment.

The **DUSTSHIELD** utilizes a unique two stage fan filter system to create an ultra clean positive pressure environment.

DUSTSHIELDS are easy effective and affordable. Access to Drives etc is unhampered. Custom Made for CPU's, Monitors, Servers, Workstations, Laser Printers and many others.

ENVIROSAFE TECHNOLOGIES
800-719-9499
Jax, FL • Fax 904-646-3575
Internet: 74367.2222@compuserve.com

DS 850—CPU, Monitor & Keyboard

CIRCLE 790 ON READER SERVICE CARD

PREMIER

NETWORKING • PERIPHERALS



KODAK DC-40



KODAK RPS-3570



IOMEGA JAZ



FARGO FOTO FUN

Limited Quantity
SUPER SPECIAL!
KODAK DC-40
DIGITAL CAMERA
\$639.95

THIS MONTH'S
SPECIAL!
IOMEGA INTERNAL
JAZ DRIVE
\$479

CALL TOLL FREE!

1-800-817-7804

DIGITAL IMAGING EQUIPMENT

Our highly technical, professional, and knowledgeable staff at SDISC, is composed of engineers, photographers, and other specialists. We are here to provide you with the highest level of technical expertise. Delivery, setup, and installation on premises are available. **WE CARRY A COMPLETE LINE OF COMPUTER & IMAGING EQUIPMENT.**



*KODAK *MICROSOFT
*ADOBE *EPSON
*FARGO *APPLE
*IOMEGA *HP
*IBM *ETC

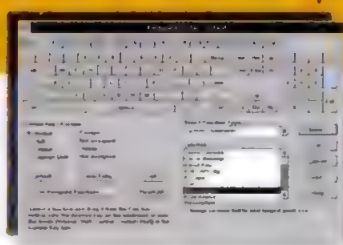


FAX: (516) 484-3334
48 Flamingo Rd N. Roslyn, N.Y. 11576

CIRCLE 791 ON READER SERVICE CARD

Distinct IntelliTerm

Integrated Terminal Emulator for DEC and IBM® Systems



Highlights:

- TN3270 Emulation—Models 2,3,4 and 5 (for IBM Mainframes)
- 3179G Vector Graphics & 3279S3G
- TN5250 (24x80, 27x132) (for AS/400)
- VT52, VT100, VT220, VT320 & VT420 emulation (for DEC and UNIX Systems)
- Customizable keyboard layouts, poppads and session profiles
- VBA™ Advanced Scripting Language
- DDE, HLLAPI, EHLLAPI, WinHLLAPI and Visual Basic™
- Available for Windows 3.11, Windows 95 and Windows NT

distinct
The world's most advanced terminal development tools

408.366.8933

WWW: <http://www.distinct.com>

Fax: 408.366.0153

E-mail: pcmag@distinct.com

Fastfacts: 408.366.2101

CIRCLE 792 ON READER SERVICE CARD



Walnut Creek CDROM

Order Now! • 24 hours a day!

Blackhawk '95
CICA for MS Windows
Newt for Windows NT
Linux Slackware 3.0
FreeBSD 2.1
Perl
The Viper Toolkit
Hobbes OS/2 Archived
Command & Conquer

Latest Windows 95 shareware, utilities, app's, accessories. \$29.95
3,500 Windows programs, freeware, demos, drivers, utilities. \$29.95
NT shareware, utilities, programming tools, patches, etc. \$39.95
Internet's favorite operating system. Full PC Unix. 2 discs. \$39.95
Full 4.4 BSD Lite-based 32-bit operating system. Rock stable. \$39.95
Latest edition packed with Perl source code, docs, & more. \$39.95
850 files for visual programming in Visual Basic, C/C++, etc. \$39.95
OS/2 mag's product of the year: 1000 MB current shareware. \$29.95
and Warcraft 2 Toolkit. Add-ons for these hot selling games. \$19.95

Call about our subscription offer where \$29.95 discs are \$19.95, and \$39.95 discs are \$24.95

All our CDROMs
are **unconditionally**
guaranteed!

1-800-786-9907 <http://www.cdrom.com/>

Shipping \$5 per order/US
\$9 per order/Overseas

Phone +1 510 674-0783 x 517 • Fax +1 510 674-0821 • E-mail orders@cdrom.com

Walnut Creek CDROM • Suite D-517, 4041 Pike Lane, Concord CA 94520, USA

517

CIRCLE 796 ON READER SERVICE CARD

No more pre-printed checks!

Save time and money printing your
own checks with **mips VersaCheck™!**

Revolutionary mips VersaCheck™ is the inexpensive software that not only lets you print your own completely valid checks from scratch, but automatically keeps your account balances too! mips VersaCheck installs in Word for Windows and lets you create checks in minutes. Include addresses, logos, even your signature, all password protected. mips VersaCheck even prints the MICR account number required by all banks for processing. And, you can make changes to your checks at any time, instantly!

- ✓ Print checks for as little as **2.7 cents per check!**
- ✓ Prints bank drafts and deposit slips
- ✓ Manage an unlimited number of password-protected accounts
- ✓ Compatible with inkjets and laser printers
- ✓ Compatible with Quicken, QuickBooks, PeachTree and more

To order, call **800-898-8560**

mipsVersaCheck™

SAP \$49.95

mips

Dateline America Inc.

Tel: 619-679-4070 Fax: 619-679-4073
13240 Evening Creek Drive, Suite 311 San Diego, CA 92128

Also available through:

Tiger Soft

PC Mail

MicroWarehouse

800-888-4437

800-555-MALL

800-367-7080

CIRCLE 793 ON READER SERVICE CARD

Transform Spreadsheets into User-Proof Applications Visual Baler™ \$199

- ➔ Create spreadsheets that run without the original applications
- ➔ Make secure, tamper-proof forms for data collection
- ➔ Distribute custom applications **Royalty Free**

Transform your favorite Lotus 1-2-3™, Microsoft Excel™ and Quattro Pro™ spreadsheets into 100% tamper-proof electronic forms for collecting inventory, sales, or accounting data such as time & expense reports or financial modeling. Easily create Windows 3.1 and Win 95 stand-alone applications that **run without the original applications** and because they're tamper proof, you ensure that data collection and analysis is not corrupted by user errors or formula editing. Best of all, distribute them without paying any royalties or fees.

Order Visual Baler now and get FREE Installation Software!

Create disks for distribution with **InstallBOSS™**, the professional install program generator with an easy to use graphical interface. Step by step design environment gives you complete control of all installation parameters including disk space requirements, file compression, file splitting, bitmap backgrounds, disk titles, success and error messages. **List Price \$149**

TECH TOOLS

3-1 Taggart Drive • Nashua, NH 03060

email: info@techtools.com

www.techtools.com



For more information call
800-501-2677

100% Accurate Diagnostics!

Technicians—Get the best tools on the market!

Micro-Scope 6.1 Post-Probe

Award Winning

BYTE



GSA Approved

Windows 95 COMPATIBLE

● Winner of BYTE Magazine Pournelle's Users Choice Award ● Universal—Works with any IBM or compatible PC regardless of Operating System. ● Bypasses DOS, Windows, Unix, OS/2, etc. and does DIRECT HARDWARE DIAGNOSTICS of all drives, all memory, all ports, sound cards, keyboard, mouse, etc. ● Low-level formats IDEs!



- Diagnoses down to individual chip level.
- Used by technicians around the world.
- Vinyl carrying case. ● Detailed manuals

NEW—Get the secrets of professional PC diagnostics and repair on video cassette. Several titles available...

1-800-864-8008

<http://www.micro2000.com>

2000

CIRCLE 797 ON READER SERVICE CARD

Only BatteryDisk™ Rescues Your PC from CMOS Battery Failure

When your CMOS batteries fail — and they will — your PC won't boot DOS; Windows won't load; the keyboard won't respond. But now you can protect your systems with BatteryDisk.

BatteryDisk is the easy-to-use program that rescues PCs from CMOS battery failure. Run the setup program and in just seconds, BatteryDisk records unique, vital data about a computer's hard drives (sectors, tracks and landing zone offset), CPU cache, bus speed, DMA Transfer mode and Shadow Memory Base settings.

When your CMOS batteries fail, just insert BatteryDisk, turn on the PC and keep on working. BatteryDisk takes care of everything — quickly and reliably.



"Millions of PC owners' CMOS batteries fail each year. Don't get caught without BatteryDisk!"

"This is one program you can't live without."

"With BatteryDisk I can keep working, even if my CMOS battery fails. That saves me time and money."

Order Now! Call 1-800-248-4217



International Systems Inc.
351 West Hubbard St., Suite 501
Chicago, IL 60610
312-222-1364 • 312-222-9226 (fax)

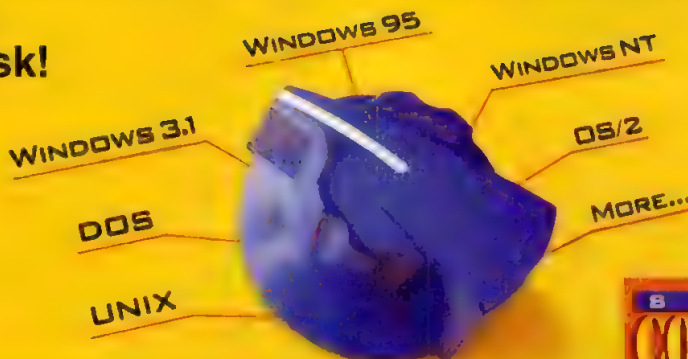
Catch us on the net! <http://www.isi.inter.net>

Also available at
COMPUSA
The Computer Superstore
MEDIAPLAY
More Power Into Your PC
MICRO CENTER
The Computer Experts

CIRCLE 796 ON READER SERVICE CARD

Windows NT • Solaris • Linux • Windows 95 • OS/2 • PC-DOS • SCO UNIX

Switch without Risk!



System Commander makes it safe and easy to add as many OSes to your PC as you want!

Easy Automatic Installation

- Prepares your PC for new OSes in minutes
- Simply select the OS you want and System Commander does the rest
- To use another OS simply reboot and make another selection

Money-Saving Flexibility

- Minimize hardware expenses by putting up to 100 OSes on one PC
- Use any combination of hard drives

- Use any Intel compatible OS or combination of OSes, in English or any other language

System Commander is only \$99.95 and comes with an unconditional 60 day money back guarantee. Get **Free** overnight shipping when you mention this ad. *Order it now and have it on your desk tomorrow morning!

"Highly recommended"

John C. Dwyer PC Magazine

SYSTEM COMMANDER

Free overnight shipping* when you mention this ad.

800-648-8266
www.v-com.com

V Communications, Inc.
4320 Stevens Creek Blvd., #120-4PCM
San Jose, CA 95129
408 296 4224 fax 408.296.4441

* When ordered before noon PST No Saturday delivery. Standard shipping outside US CA res. add \$7.25 sales tax. Offer subject to change without notice. All logos and product names are trademarks of their respective companies. VISA/MC/Amex ©1996

Windows v3.x • DOS/V • Windows 95J • Warp • MS-DOS • Linux • Merlin

CIRCLE 798 ON READER SERVICE CARD

Video Training for Windows Applications

KEYSTONE LEARNING SYSTEMS CORPORATION

Microsoft
SOLUTION PROVIDER



Dan Balter
Microsoft Certified Trainer
& Windows 95 Instructor



Dennis Taylor
Microsoft Excel Specialist
& Excel Instructor



Alison Balter
Microsoft Certified Developer
& Access Instructor



Rob Aronson
NetWare 4.1 Instructor &
Novell CNI & ECNE

Windows 95 or 3.11

Beg/Int/Adv (ea) \$49.95
Special All Three \$129.95
Networking 49.95
Installation 49.95
Special Features 49.95
Special All Six \$239.95

Word 95 or 6.0

Beg/Int/Adv (ea) \$49.95
Special All Three \$129.95
Desktop Publishing \$49.95
Mail Merge \$49.95
Tables & Forms \$49.95
Special All Six \$239.95



Excel 95 or 5.0

Beg/Int/Adv (ea) \$49.95
Special Features \$49.95
Special All Four \$189.95
Project 95 or 4.0

Project 95 or 4.0

Level 1/2/3/4 (ea) \$89.95
Special All Four \$299.95
Internet User

Internet User

Explor the Net 1-2 (ea) \$49.95
Netscape Nav. 2.x \$49.95
Special All Three \$129.95
Internet Develop.

Internet Develop.

Java Lev 1-4 (ea) \$89.95
Special All Four \$299.95
HTML Lev 1-3 (ea) \$89.95
JavaScript Lev 1-3 (ea) \$89.95
Special All Three \$249.95
Special All Six \$449.95

Visual Basic 4.0

Level 1/2/3 (ea) \$89.95
Level 4/5/6 (ea) \$89.95
Special All Three \$249.95
Special All Six \$449.95

Visual Basic 4.0

Level 1/2/3 (ea) \$89.95
Level 4/5/6 (ea) \$89.95
Special All Three \$249.95
Special All Six \$449.95

Visual Basic 4.0

Level 1/2/3 (ea) \$89.95
Level 4/5/6 (ea) \$89.95
Special All Three \$249.95
Special All Six \$449.95

Visual Basic 4.0

Level 1/2/3 (ea) \$89.95
Level 4/5/6 (ea) \$89.95
Special All Three \$249.95
Special All Six \$449.95

NetWare 4.1

Level 1/2/3/4 (ea) \$89.95
Level 5/6/7 (ea) \$89.95
Special All Four \$379.95
Special All Seven \$449.95
3.x to 4.1 Upgrade \$49.95

Windows NT 3.5x

Installation \$89.95
Serv. Level 1-2 (ea) \$89.95
NT Workstation \$89.95
Special All Four \$299.95

CoreDRAW! 8

Beg/Int/Adv (ea) \$49.95
Special All Three \$129.95
Domestic Shipping 7 Days \$5.00 for
the first three videos; plus \$1.00 for each
additional video case

CoreDRAW! 8

Beg/Int/Adv (ea) \$49.95
Special All Three \$129.95
Domestic Shipping 7 Days \$5.00 for
the first three videos; plus \$1.00 for each
additional video case



Special MS Office 95 Video Combinations

MS Office 95 Standard (9 videos/17 hours) \$349.95 (with KeyNotes \$489.95)
MS Office 95 Pro (13 videos/24 hours) \$499.95 (with KeyNotes \$639.95)
MS Office 95 Plus (16 videos/29 hours) \$579.95 (with KeyNotes \$749.95)



Special MS Office 4.x Video Combinations

MS Office 4.x Standard (9 videos/17 hours) \$349.95 (with KeyNotes \$489.95)
MS Office 4.x Pro (13 videos/24 hours) \$499.95 (with KeyNotes \$639.95)
MS Office 4.x Plus (16 videos/29 hours) \$579.95 (with KeyNotes \$749.95)



Special Core Office Video Combinations

Corel WordPerfect Suite Standard (9 videos/17 hours) \$349.95
Corel WordPerfect Suite Pro (13 videos/24 hours) \$499.95
Corel Office Professional (16 videos/29 hours) \$579.95

3 Easy Ways to Order:

CALL 1-800-748-4838
801-375-8680

FAX 1-801-373-6872

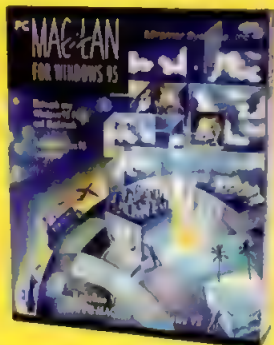
MAIL KeyStone Learning Systems Corp.
2241 Larson Parkway • Provo, UT 84606
<http://www.keystonesys.com/> AD# PM106

CIRCLE 799 ON READER SERVICE CARD

Network Mac OS with Windows 95

NEW! PC MACLAN for Windows 95 is the only peer-to-peer networking software for sharing printers, files, drives, and other resources between Mac OS and Windows 95 PCs. Macs share files from any Win95 PC through Chooser. Win95 PCs mount local Macintosh drives through Network Neighborhood. Supports most LAN software; numerous applications; Ethernet, TokenRing, and LocalTalk.

- The only cross-platform, peer-to-peer solution for Win95 and Mac PCs
- 32-bit AppleShare client and server technology
- Works independently or complements existing LANs
- Supports the Win95 "Chooser" utility Network Neighborhood
- Print to any Apple or PostScript printer
- Share local hard floppy and CD ROM drives between PCs and Macs
- Share files and volumes using long file name formats
- Back-up Win95 files and drives from a Mac



Order now
Miramars Systems
800-862-2526

Call for competitive upgrades

Come Visit Our Booth (#637)
at Seybold San Francisco

email: sales@miramarsys.com
www.miramarsys.com

CIRCLE 800 ON READER SERVICE CARD

Student-Teacher-School Discounts!

MiniCAD+6 \$115 \$129	WordPerfect 7.0 \$199 \$219	CorelDRAW 6.0 \$199 \$219	Director 5.0 \$199 \$219
MathCAD 2.0 \$115 ARC Graphics Suite \$149 Aut 2.0 \$129 Animator Studio 1 \$119 ArchCAD 4.55 \$495 Astound 2.0 \$125 Authorware Pro3 \$595 Berland C++ 5.0 \$159 Berland C++ Dev \$199 Calcomp 12x12 \$229 Calcomp 12x18 \$279 CalendarMaker3 \$1537 Camvas 3.5 \$99 Claris Works 4.0 \$69 Coda-Finale 3.5 \$249 CorelDRAW 5.0 \$159 Corel Office Pro 7 \$169 dBASE 5.0 DOS \$159 Delphi Desktop 2 \$99 Delrina CommSuite \$99 Director MM Studio \$899 Elastic Reality 1.2 \$219 Extreme 3D \$199 FileMaker Pro 3.0 \$129 Fontographer 4.1 \$149 Fractal Dabbler 2 \$545 Freehand Studio \$389 Genenc CAD 6.1 \$99 Harvard Graphics 95 \$149 Kais Power Tools \$378 Kamp Word 3.0 \$179 KPT Converter 1 \$578 KPT Power Photos \$78 Lightwave 3D 5.0 \$795 Lotus 1-2-3 5.0 Win \$95 Lotus 1-2-3 4.0 DOS \$95 Lotus Notes Starter \$495 MathCAD Plus 6.0 \$149	Mathematics 2.2.4 \$115 McAfee VirusScan 95 \$49 MiniTab Rel 11 \$249 Multimedia 7 Book \$479 Norton AntiVirus 95 \$49 Norton Navigator 95 \$55 Norton Utilities 95 \$79 Norton Utilities 8.0 \$79 OS-2 Warp 3.0 \$69 OmniPage Pro 7.0 \$249 Organizer 2.1 \$59 Paradox 7.0 \$139 PC Anywhere 3.0 \$89 Q&A 4.0 DOS \$149 Q&A 4.0 Win \$149 QEMM 8.0 \$59 Quattro Pro 6.0 \$99 Quickbooks 4.0 \$98 Quickbooks 4.0 CD \$128 Quicken Deluxe 5 \$59 SmartSuite 95 \$159 SPSS 6.1 Student \$79 TimeLine 6.5 Win \$249 TrueSpace 2.0 \$339 TrueSpace 2.0 SE \$89 Turbo Assembler \$79 Turbo C++ 4.5 \$59 Turbo Pascal \$79 Visio 4.0 \$99 Visio 4.0 Technical \$199 Visual dBASE 5.5 \$159 VisualAge C++ 3.0 \$219 Wacom ArtZ 6x8 \$285 Wacom ArtZ 12x12 \$439 Walkthrough Pro2 \$529 Winprobe 4.0 W95 \$39 XRES 1.21 \$199	Delphi \$159 Delphi Develop2 \$215 Painter 4.0 \$215 AutoCAD LT 95 \$299 AutoCAD LT 95 \$299 Freehand 5.0 \$159	

Order (800) 261-8117

Software Plus Academic Inc.
377 Route 17 South #116
Hasbrouck Heights, NJ 07604
Tel (201) 288-7441 Fax (201) 288-7442

Call for 1000's more...including Microsoft & Adobe.
Purchase Orders are accepted from schools!
Call for memory & CPU prices.

CIRCLE 801 ON READER SERVICE CARD

Keys To Success

Earn your B.S. or M.S. degree in Computer Science—in your own home at your own pace and save thousands of dollars.



- All courses home study
- Increase your earning power
- Approved for tuition reimbursement by leading companies
- Follows ACM/IEEE guidelines
- Instructors available via phone, fax or Email

For free information contact us at 1-800-767-AICS or <http://www.aics.edu>

AMERICAN INSTITUTE OF COMPUTER SCIENCES

ACCREDITED MEMBER
World Association of Universities & Colleges

Ask For **indigo** Short-Run!

OVERNIGHT

Digital Output PC or Mac

- DIGITAL OFFSET PRINTING
- 54" WIDE PAPER/VINYL POSTERS
- SLIDES & OVERHEADS
- 4X5 8K FILM IMAGING
- DYE-SUB COLOR OUTPUT

800.398.5816 or 404.351.5800
1575 Northside Dr. Ste. 490 Atlanta, 30318
www.imagers.com

Kodak Provider

CIRCLE 905 ON READER SERVICE CARD

BECOME A CNE...FAST!

THE FIRST CNE COMPUTER BASED TRAINING PROGRAM IS HERE...

The first 100% Computer Based Training (CBT) program to fully prepare you for Novell's CNE exams. Its innovative design provides fast, effective and convenient training to anyone wishing to become a Certified NetWare Engineer, even when hampered by a busy schedule. Our CNE CBT allows you to learn and practice everything you'll need for full NetWare certification.

BONUS: Now includes a full working version of Micro House Technical Library on CD-ROM!

- All on one CD
- Interactive NetWare simulation for hands-on exercises
- Study at your own pace
- Hundreds of practice questions
- Everything you need to prepare for Novell's tests!

For more information about AxiMicro's award winning training (CNE)...
1-800-653-4933

CIRCLE 903 ON READER SERVICE CARD

Display SVGA on your TV!

TV SuperScan2 converts SVGA up to 1624 x 758 into a video signal. A professional quality scan converter using exclusive Video Buffer technology and will work with any operating system or platform using SVGA.

- Supports 1624x768 in up to 16.7 million colors
- Auto adjusting scanning freq. 24-48KHz h and 60-75KHz v
- On TV-Screen menu control
- Broadcast Quality (HS-170) for video broadcasting or taping
- NO SOFTWARE DRIVERS NEEDED!

For more information or dealer nearest you, call
800 888-5244
Sales 310 926-1928
FAX 310 926-0518

Visit our website @ <http://www.ADS-MM.com>

CIRCLE 906 ON READER SERVICE CARD

No Software Required • Easy Installation • Plug & Display

Presentations on TV made easy with TV ELITE Pro

The Complete Presentation System

- Soft touch controls for Flicker Filter, Horizontal and Vertical Positioning on the TV Elite Pro
- Supports Super VGA 640 x 480 x 16.7 million colors
- RCA & S-VHS outputs to TV, VCR & Video projectors
- ZOOM, DRAW, SPOTLIGHT & 60 more fix effects
- Wireless Remote Mouse with programmable buttons

1-800 888-5244
Sales 310 926-1928
FAX 310 926-0518

*TV Elite Pro also available separately

Visit our website at <http://www.ADS-MM.com>

CIRCLE 907 ON READER SERVICE CARD

LEST WE FORGET®

A HISTORY OF THE HOLOCAUST

WE MAY NOT EVER UNDERSTAND IT... BUT WE MUST NEVER FORGET

A MULTIMEDIA CD ROM THAT OFFERS A POWERFUL TESTAMENT TO THIS DEFINING EVENT OF HISTORY IN WORDS, SOUND, AND PICTURES AN EVENT THAT EVEN IF IT CAN NEVER BE THOROUGHLY UNDERSTOOD MUST NEVER BE FORGOTTEN

Windows and Mac Compatible

logos
RESEARCH SYSTEMS

1-800-87-LOGOS
<http://www.logos.com>

CIRCLE 908 ON READER SERVICE CARD

CREATE PROMOTIONAL SCREEN SAVERS!

IDLE-EYES™

IDLE-EYES™ is a unique screen saver customization tool, designed to enhance corporate images and increase product visibility. Utilize a combination of corporate logos, product photos, video clips, graphics, music, sound effects and text to create eye-catching and informative screen savers. With IDLE-EYES, it's easy to create custom screen savers to market virtually any product or service. IDLE-EYES keeps your company where it needs to be—in front of your clients' eyes, over and over again.

\$199.99 Developer's Version / \$24.99 Personal Version
To order or for information: (800) 696-8128
(EMAIL) sales@compunnel.com

compunnel
SOFTWARE GROUP INC.

CIRCLE 904 ON READER SERVICE CARD

SALES

“PC Magazine Premier advertising works for us. We're advertising to sell off the page. In Premier that's what our ad does!”

PUT YOUR AD HERE AND WRITE YOUR OWN PC MAGAZINE SUCCESS STORY. START ADVERTISING NOW! CALL 800-825-4237 TODAY!

—Mike McCoy
President
Advanced Digital Systems

IBM • SANYO • LEADING EDGE • DTK • SPERRY • AST • WYSE

ROM BIOS UPGRADES

AMI • PHOENIX • MR BIOS • AWARD

WE STOCK THE LARGEST VARIETY OF ROM BIOS UPGRADES IN THE WORLD.

- EIDE/LBA translation
- DX4 75/100 support
- P24T and Pentium support
- 64 bit video support
- Windows/95
- Plug-n-Play support

• WE WILL BEAT ANY ROM BIOS COMPETITORS PRICE-CALL US TODAY!

• FREE Catalog • FREE Chip puller • FREE Tech support • Volume Discounts • Univ. & Corp. PO's Welcome • Same Day Shipping • DEALERS WELCOME • Call for special pricing, free bios resellers list

FEATURES OF A NEW BIOS

- LBA Translation • Enhanced IDE support • Support for drives with cylinders greater than 1024
- Eight hard drive support (on some versions) • Support 1.2 mb 1.44mb+2.88mb floppy drives
- Four floppy support • Support CD ROM • 32 bit block mode transfer • Support Windows/95
- Plug-n-Play support • Four serial port support • Three levels of password protection
- 64 bit video support • D4 75-100 support • P24T and Pentium processor support
- Virus protection • Complete setup in ROM • Comprehensive users manual

UNICORE SOFTWARE INC.

MA, FL, CA, Offices

FAX (508) 683-1838 ORDER 800-800-BIOS (2467) TEL (508) 686-8468

1538 TURNPIKE ST • NORTH ANDOVER, MA 01845

ACER • SAMSUNG • KAYPRO • COMPUADD • PACKARD BELL

CIRCLE 805 ON READER SERVICE CARD

Put your Company on the World Wide Web!

INTERNET

VIRTUAL WEB HOSTING

\$24.95 per month*

- Domain name registration provided (http://your_name)
- Unlimited updates via your own FTP account
- 500 MB of data transfer per month (100/2 per MB over 100 MB)
- 10 MB of disk space for your html documents & graphics (10 per MB over 10 MB)
- Full T1 to the Internet
- Unlimited e-mail address forwarding
- Custom CGI script support via your own cgi-local directory
- Detailed web usage statistics & access to raw log files
- Controlled anonymous FTP
- TrueSpeech™ server support included (real-time audio)

Also Available:
Graphics and Page Design
Real Audio™ 2.0
SSL Secure Processing
MySQL Database Tools

Hiway Technologies

1-800-339-HWAY sales@hiway.net (407) 989-8574

CIRCLE 810 ON READER SERVICE CARD

40+ Hottest Businesses From Your Home With A Computer!

Special FREE Report Now Available—

- What home businesses are working—where
- What equipment you will need and where to get it
- What you will do
- Which businesses you can start part time and retain your present job
- What your costs will be
- Where you can get financing
- Where to get training
- How to market yourself, your services and products when you work from your home
- What your potential is for growth.

Call 1-800-343-8014, ext. 4327

...For this new FREE special report and cassette tapes.

Computer Business Services, Inc., CBSI Plaza, Ste. 4327, Sheridan, IN 46069

CIRCLE 811 ON READER SERVICE CARD

ATTENTION INTERNET USERS

Call Anywhere in America from Anywhere in the World for 10¢/minute.

(and save up to 95% on calls to every other country in the world)

- Cellular quality
- The first service which allows you to call any phone in the world from your PC
- FREE software from our website
- No setup charges
- FREE trial to any toll-free 800 or 888#

RATES FROM THE U.S. TO

JAPAN	40¢
GERMANY	36¢
SINGAPORE	36¢
FRANCE	35¢
AUSTRALIA	28¢
SWEDEN	22¢
U.K.	18¢

Visit our website for complete details and free software
<http://www.net2phone.com>

Call us toll-free using Net2Phone at 1-800-438-8879 or direct at 201-928-2990. E-mail us at: info@net2phone.com

NET2PHONE™

Putting global calling within everyone's reach.

Net2Phone requires caller only to have multimedia PC with any PPP Internet connection. Receiving party gets call on regular phone. *15¢ peak 10¢ off peak rates.

PCMI096

NET2PHONE IS A TRADEMARK OF IDT CORPORATION

TOTAL INTERNET

\$15.95 MONTHLY

FULLY GRAPHIC! FREE Netscape™

For 56K or T1 please call (800) 573-9438

UNLIMITED! UNCENSORED!

The lowest flat monthly national Internet rate. Modem™ and Windows™ 3.x/95 compatibility. No per minute charges. Unlimited tech support 24 hours a day. Internet access available in most U.S. cities.

<http://www.idt.net/>

PCM1096

SAVE UP TO 99% MONTHLY WITH IDT

Monthly Usage	CompuServe™	AOL™	AT&T™	IDT
1.5 Hours per day	\$73.70	\$93.70	\$19.95	\$15.95
3 Hours per day	\$161.45	\$226.45	\$19.95	\$15.95
All day	\$1,389.95	\$2,084.95	\$19.95	\$15.95

With IDT phone service (\$19.95 without) With AT&T phone service (\$24.95 without) IDT phone rates are up to 50% below AT&T. Pricing as of June 1996. IDT is a trademark of IDT Corp. All other trademarks are the property of their respective owners.

1-800-371-0438 **IDT Internet**



Welcome To **Your Future!**

Performance Hardware Delivering **Instant Net Response**
Including Satellites, PC Systems, And Solutions

INTRODUCING

The **DirecPC™** by Hughes Network Systems™

DirecPC™ is Turbo Internet™. This satellite based system grabs data off of the Internet throws it 22,300 miles into space to a satellite, bounces back down to a 21" dish on your roof and shoots it straight to your PC at **400Kbps**, that's 28 times faster than the average modem. Boredom Not Included™.

\$849.00

System Includes: 21" Fiberglass Dish, ISA Adapter, Software.

What is your time worth?

800-560-0555



By the time you've read this, you could have downloaded the entire state & video clips from last night's game on ESPN, if you were using Hughes' DirecPC. Otherwise, you would still be waiting.....and waiting.....

Also Available: Fully Configured **Renaegade Systems™** DirecPC

SUREAIR
Exclusive National Installer

Renaegade Systems™

GEOSAT
COMMUNICATIONS
800-560-0555

CIRCLE 553 ON READER SERVICE CARD

1-800-BATTERIES

LAPTOP • CELLULAR • CAMCORDER

Call for a **FREE**
Battery Guide
& Catalog!

- 24 HOUR SERVICE
- 1 YEAR GUARANTEE
- OVERNIGHT DELIVERY
- OVER 4000 BATTERIES
- NOTEBOOK & TRAVEL TOOLS



POWER EXPRESS

Batteries and tools for the mobile executive
Call 1-800-228-8374 24hrs/day
www.powerexpress.com

CIRCLE 551 ON READER SERVICE CARD

RECORD CD'S
AUDIO • VIDEO • DATA
AVD
NEW! AVD Series of CD-R solutions...
4X 74 \$999
2X 74 \$599

ONLY \$1299

OPTICAL BLOWOUT
128MB...
230MB...
650MB Optical...
1.30s Optical...

Check Out Our Internet Site at **MEDIASTORE.COM**
<http://www.mediastore.com>
800-555-5551

CIRCLE 552 ON READER SERVICE CARD

Infinity Micro

SOLID PRODUCTS - EXCELLENT VALUE

800-213-2987

Infinity Systems:

IPS-166+s Model

Midi Tower Model
133 Mhz Cyrix P-166
16MB SDRAM Memory
256K VX Pipeline Burst Cache
1.6GB Western Digital HD
120W Hi-Fi Stereo Speakers
8X EIDE CD-ROM Drive
Sound Blaster 16
Universal Serial Bus (USB)
Trio S3 2MB Video Accelerator
Microsoft Ergonomic Mouse
Windows 95 Keyboard
Windows 95 or WFW 3.11
30 days software support
3 Year Limited Warranty
166+ with SDRAM \$1549

IPS-P133e Model

Midi Tower Model
133 Mhz Pentium Processor
16MB EDO Memory
256K VX Pipeline Burst Cache
1.6GB Western Digital HD
120W Hi-Fi Stereo Speakers
6X EIDE CD-ROM Drive
Sound Blaster 16
Universal Serial Bus (USB)
Trio S3 2MB Video Accelerator
Microsoft Ergonomic Mouse
Windows 95 Keyboard
Windows 95 or WFW 3.11
30 days software support
3 Year Limited Warranty
133 Mhz with EDO \$1449

IPS-P100 Model

Midi Tower Model
100 Mhz Pentium Processor
16MB Memory
1.6GB Western Digital HD
Trident 1MB Video Accelerator
Microsoft Ergonomic Mouse
Windows 95 Keyboard
3 Year Limited Warranty
100 Mhz Workhorse \$849
New!! Opti 924 P-N-P Sound Blaster Compat. \$50
Sony 15x1 15" 1280x1024 65Hz Refresh \$425
Hitachi 14" 1024x768 NII Monitor \$230

CPU

Intel Pentium	Cyrix 6x86
P-200 \$CALL	686-P166+ \$290
P-166 \$500	686-P150+ \$200
P-150 \$365	686-P120+ \$130
P-133 \$260	
P-120 \$180	Pentium Pro
P-100 \$140	Pro-200 \$750
P-75 \$100	

Memory

Standard 72 pin

4MB	1x32/36	\$30/\$40
8MB	2x32/36	\$55/\$65
16MB	4x32/36	\$105/\$115
32MB	8x32/36	\$230/\$235

EDO 72 pin

4MB	1x32	\$35
8MB	2x32	\$40
16MB	4x32	\$110
32MB	8x32	\$240

168 Pin Dimms

Standard 8M/16M/32M	\$70/\$135/\$250
EDO 8M/16M/32M	\$75/\$140/\$260
SDRAM 8M/16M/32M	/ \$205/

MISC

4X CD-ROM SET
8X CD-ROM SET
8X CD-ROM SET
8X CD-ROM SET
10.4in Diamond Video Card - 2MB EDO \$120
4d Memory Impager \$28
Ethernet Card 10/100/1000 \$100
1000MHz Midi Tower Case \$60

Hard Drives

4.3GB Quantum Atlas \$825	1.2GB Seagate S1270 \$196
2.1GB Seagate 32140 \$268	1.2GB WD AC 21200 \$196
2.1GB WD AC 32100 \$332	1.0GB Seagate 51080 \$185
1.6GB Seagate 31640 \$275	1.0GB WD AC 21000 \$185
1.6GB WD AC 31600 \$229	850MB Seagate 3851 \$175
	840MB Quantum \$155

Modems

14.4 Voice/Fax/Data \$45
28.8 Voice/Fax/Data \$110
33.6 USR Protocol V.34+ Fax/Data \$115

NEW Intel VX Motherboard 256K VX Pipeline Cache w/ USB \$140

Intel FX Motherboard w/ 256K Pipeline Cache \$125

Q Same day shipping on most products
Q No surcharge on Credit Cards
Q Prices subject to change without notice
<http://www.infinitymicro.com>

Infinity Micro Inc.
211 172 E Grand River Ave
P.O. Box 100
E Lansing, MI 48823
Call (517) 332-8105
Fax (517) 332-7389

CIRCLE 555 ON READER SERVICE CARD

PERFORMANCE & VALUE SYSTEMS

WE WELCOME UNIVERSITY, SCHOOLS, GOVERNMENT & CORPORATE P.O.'S

YOUR ONE STOP SHOPPING CENTER

AMS NOVICE

- 486 DX2-66 Mhz
- Mid Tower W/230 Watts PS
- PCI MR, 2S, 1P 1 Game Port
- Flash Bios W/Plug & Play
- 3.5 High Density Floppy
- 8 MB EDO RAM (128 MB Max.)
- 14.4 Int. Fax/Modem
- 170 MB HD (H20 MB Max.)
- KB W/Win 95 Compl.
- 1 Yr. Parts, Lifetime Labor
- **** BEST BARGAIN ****

\$ 399.00

AMS GRADUATE MULTIMEDIA

- 5x86 - 133 Mhz
- Mid Tower W/230 Watts PS
- PCI MR, 2S, 1P 1 Game Port
- Flash Bios W/Plug & Play
- 3.5 High Density Floppy
- 8 MB EDO RAM (128 MB Max.)
- 14.4 Int. Fax/Modem
- 170 MB HD (H20 MB Max.)
- KB W/Win 95 Compl.
- High Resolution Serial Mouse
- 14" SVGA 28 Monitor
- 1 Yr. Parts & Lifetime Labor

\$ 899.00

AMS BASIC PROFESSIONAL

- PENTIUM® 100 Mhz INTEL
- Mid Tower W/230 Watts PS
- PCI, 256K Pipeline Burst Cache
- Flash Bios W/Plug & Play
- 3.5 High Density Floppy
- KB W/Win 95 Compl.
- High Resolution Serial Mouse
- 1 Yr. Parts & Lifetime Labor

\$ 399.00

AMS UPGRADER

- 5x86 - 133 Mhz

\$ 249.00

HAPPY HOLIDAYS AMS PROFESSIONAL MULTIMEDIA

- PENTIUM® 120 Mhz INTEL
- Mid Tower W/230 Watts PS
- 3-PCI, 4 ISA, 256K Pipeline Burst Cache
- Flash Bios W/Plug & Play
- 2H/3Prt. Serial, 1 Busch, Parallel
- 16550 UART & EPP/PCP
- 3.5 High Density Floppy
- 8 MB EDO RAM (128 MB Max.)
- 1MB PCI Grph. Acbr. (2MB Max)
- 1 ORGR. HD, 6X CP-ROM HD
- 16 Bit Sound Cd w/Amplif. Spkr.
- High Resolution Serial Mouse
- KB W/Win 95 Compl.
- 14" SVGA MONITOR .38
- 14.4 Int. Fax/Modem
- 1 Yr. Parts & Lifetime Labor

\$ 999.00

AMS ULTIMATE MULTIMEDIA

- Pentium® Pro 200 Mhz
- W/256K Cache
- 32 MB EDO Ram
- 1.6 GB Hard Disk Drive
- 33.6 Voice/Fax/Modem
- 3.5 HD Floppy
- 2 MB PCI Video Diamond MPEF
- 6X CD ROM J01
- 16 Bit Sound card W/Amplif. Spkr.
- 104 Windows 95 Keyboard
- High Resolution Serial Mouse
- Microsoft Windows 95
- 1 Yr. Parts & Lifetime Labor

\$ 1999.00

ANTHONY CORNER

- 486 Mhz \$ 579
- 486 Mhz \$ 579
- 120 Mhz \$ 599
- 210 Mhz \$ 1299

MEMORY

- 10X3-70 \$ 19.99
- 4X3-70 \$ 35.99
- 4MB-72 Pin \$ 35.99
- 8MB-72 Pin \$ 59.99
- 16MB-72 Pin \$ 99.99
- 32MB-72 Pin \$ 199.99

Motherboards & Cpu

- 486 133/286 \$ 99
- 486 133/100 \$ 109
- 486 133/100 \$ 119
- P-100 W/256K PLB \$ 299
- P-100 W/256K PLB \$ 299
- Call For CPU Pricing !!!

NOTEBOOK 2.5"

- 80 MB \$ 89
- 120 MB \$ 119
- 340 MB \$ 219
- 540 MB \$ 279
- 810 MB \$ 379
- 1.0 GB \$ 399

NEW HARD DRIVE

- IDE
- 540 MB \$ 159
- 1.0 GB \$ 179
- 1.2 GB \$ 199
- 1.6 GB \$ 229

MISCELLANEOUS

- 14" SVGA N1 28 \$ 229
- 15" SVGA \$ 299
- 6X CD ROM KGL \$ 139
- 8X CD ROM KGL \$ 159

CALL TODAY

Compare Prices
Call Us

WE BUY

RECYCLED EQUIPMENT & HARDWARE

FRAUDULENT CREDIT CARD USERS BEWARE! AMS WILL PROSECUTE TO THE FULL EXTENT OF THE LAW

!!! LIST THE AMS STAFF CUSTOMIZE YOUR PC'S CALL TODAY & ASK FOR JIM, MANDY & JACK !!!

(714) 258-8818 • FAX (714) 258-8918

Sales Hours: 7:30 A.M. - 4:30 P.M. PST

Internet: ams@calypso.com & www.calypso.com/ams

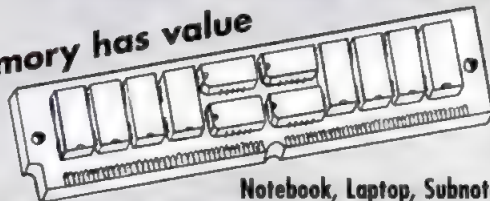
Prices subject to change without notice. 15% Restocking Fee. Not responsible for typographical errors. Leasing available. Will try to match or beat any valid advertised price.

* Premium is a registered trademark & DX2 & DX4 are trademarks of Intel Corporation

CIRCLE 560 ON READER SERVICE CARD

We'll Pay **YOU** for Your Old Memory

All Memory has value



- 1x9 4x9 30 Pin
- 1x32 2x32 4x32
- 1x36 2x36 4x36
- 8x36 72 pin

Notebook, Laptop, Subnote, Credit Card (IC DRAM) Modules

Trade-In **\$ ANY SIMMS \$** Upgrade

SOJ, TSOP, ZIP, DRAM, VRAM, IBM * Over 30 Years Experience • We now Sell Memory & CPU's

THE MEMORY LIQUIDATORS

800-718-7755

531 Main St., Ste. 1174, El Segundo, CA 90245 • Ph. 310-326-5656 • Fax 310-326-7790

"The company that buys memory back"

CIRCLE 561 ON READER SERVICE CARD

MEMORY

Guaranteed Lowest Prices • Life Time Warranty

- 30 Pin SIMMS
- 1 MB - 16 MB
- 72 Pin SIMMS
- 1 MB - 64 MB
- 72 Pin EDO
- 4 MB - 64 MB
- All Note Books
- All Printers
- VRAM, DIMM, CACHE

WE SELL INTEL, AMD, CYRIX CPU

We accept P.O.'s from government, schools & qualified firms.

Keitech International

1-800-808-6242

Phone 818 244 6242 Fax 818 500 7695

CIRCLE 563 ON READER SERVICE CARD

MEMORY 4 LESS 1-800-821-9611

DESKTOP MEMORY

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

30-PIN SIMMS

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

72-PIN SIMMS

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

72-PIN NON-PARITY

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

EDO MEMORY

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

CACHE UPDATES

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

WORKSTATION MEMORY

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

NOTEBOOK MEMORY

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

NOTEBOOK MEMORY

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

PRINTER MEMORY

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

PRINTER MEMORY

ITEM	PRICE
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125
486DX2-66 Mhz	\$125

Memory

Lifetime Warranty, 4 MB, 8 MB, 16 MB, 32 MB. Parity or non Parity, EDO available. Please Call for the latest price.

Motherboards

Triton Chipset, ISA and PCI, built in I/O controllers, 1 year Warranty.

Pentium 133 US\$ 338.00
Pentium 150 US\$ 474.00
Pentium 160 US\$ 560.00

Other Items Available

DLP Computers

1-800-241-2093

fax 954-929-1035

dip@lgc.net

Prices subject to change without notice

CIRCLE 564 ON READER SERVICE CARD

CIRCLE 562 ON READER SERVICE CARD

DEALER PRICES TO END USERS!
BEST PRICES ON NETWORK AND COMPUTER PARTS

INTEL

Intel	8820-TWP	\$62
Intel	8210-Combo	\$72
Intel	8465-FastEthernet 10/100	\$90
Intel	EC100TX-Fast Hub	\$1549

3COM

3Com	3C509B-TPO	\$65
3Com	3C509B-Combo	\$85
3Com	3C905TX 10/100	\$95
3Com	3C595TX-Fast 10/100	\$130
3Com	3C3250TX-Fast Hub	\$1849

D-LINK

E-16H	16 Port Hub	\$215
E-24H	24 Port Hub	\$335
DPE-812TX	Fast Hub	\$1129

BEST BUY!! \$2,245.00
Pentium Pro 200Mhz Multi-Media PC.
16MB RAM EDO. 1.3GB Hard Drive,
6X CD-ROM. SB16, Matrox 2MB WRAM,
25W Speakers, 15" NI. 28 Monitor,
Mouse, 104KB and Windows 95

PC COMPONENTS
We carry all Intel motherboards and CPU's
30/72 pin SIMMs available
Yamaha, HP, Sony CD read or write ROMs
in stock. 8X CD-ROM prices are dropping!
All brands of IDE and SCSI Drives available

1-800-214-9719
FAX:(510)742-7406

We accept Corporate, Government & Educational Purchase Orders.
All prices reflect a cash discount. Not responsible for typographical errors. Prices subject to change without notice. Returns require RMA#

CIRCLE 565 ON READER SERVICE CARD

BUY • SELL • TRADE
MEMORY

WE CAN BEAT ANY PRINTED PRICE IN THIS MAGAZINE
WE CAN PAY HIGHER THAN ANY ONE FOR YOUR OLD or BROKEN MEMORY

Life Time Warranty on All Parts

1-800-4-MEMORY

MEMORYBUY@AOL.COM

CIRCLE 568 ON READER SERVICE CARD

Make Money
BUILDING & UPGRADING PCs

Become a PC technician in a couple of days, not weeks. Amazing intensive fast paced course is based on clear easy to understand videos.

Includes:

- Two VHS Video Tapes
- Anti Static Wrist Strap
- Professional Repair Kit
- Workbook
- Electronic Computer Glossary
- Ongoing Tech Support

Entire Course Only \$159
— ALSO AVAILABLE ON CD —

PC Learning Series
40 New Plant Road
Owings Mills, MD 21117

1-800-659-8070

Satisfaction & Success Absolutely Guaranteed!

CIRCLE 571 ON READER SERVICE CARD

Best Quality Lowest Prices All PC's MACS Notebooks Laptops Printers

LOWEST PRICE ON ALL PC & MAC MEMORY

LIFETIME GUARANTEE
Memory for all Printers, Notebooks, and Laptops
If you don't see it Call **1-800-662-7466**

84K DIPS University, Government and Corporate PO's with Approved Credit

256K x 1DIPS

1MB x 1DIPS

256K x 4 DIPS

EDO MEMORY AVAILABLE

1-800-662-7466
Memory Upgrade Specialists Since 1987

CIRCLE 566 ON READER SERVICE CARD

Great Buys!

PENTIUM 75/100/133
8 MB RAM, 1.0 GB HDD, 1.44 MB FDD, 1 MB PCI VIDEO CARD, 6X CD ROM, 28.8 FAX, KEYBOARD, MOUSE
\$895/ \$925/\$1075

5x86/133
8 MB RAM, 540 MB HDD, 4X CD ROM MULTI MEDIA, 14.4 MODEM, 1.44 FDD, 1 MB VIDEO CARD, KEYBOARD, MOUSE
\$695
Monitors sold separately

MULTIMEDIA Blowout!
4 X CD ROM, SOUND CARD, SPEAKERS... \$110
6 X CD ROM, SOUND CARD, SPEAKERS... \$135

MONITORS
14" SVGA.39 \$169
14" SVGA.28 DP NI 1024X768 \$220
15" SVGA.28 NI \$330

FLOPPY DRIVES
1.44 MB / 1.2 MB
NEW \$28
REPAIR \$15

WE CARRY A LARGE INVENTORY OF SCSI, ESDI, IDE, AND MEMOILL HARD DRIVES AT UNBELIEVABLE LOW PRICES!

If you don't see what you need - please call!

ACS 800-774-7014
fax 714-832-1962
Int'l Orders 714-832-1786 • Tech Sp 714-832-3662

CIRCLE 569 ON READER SERVICE CARD

Automatic Disk Duplicator

Win95 DMF Support

Standalone \$1,995
from \$1,995

Industrial quality duplicators at half the price. Copies up to 165 3.5" PC & Mac diskettes per hr.

1-800-887-9906
or (510) 689-1695
Lease, Rent, Trade-in

CopyPro the low price leader

CIRCLE 614 ON READER SERVICE CARD

168 \$89.99
33.6/14.4 Modem Fax Voice
U.S. Robotic Compatible
Win 95 Plug & Play

OPEN TO THE PUBLIC
FOR ITEMS LISTED IN THIS AD ONLY

16MB, 72 pins 70ns
Brand Name SIMMs Only
NEC, SAMSUNG, etc.,
(Please Call For Latest Price)

Check Our Website for More Savings Like These...
www.168club.com

\$99.88 CALL FOR MORE INFO (888)CALL 168

CIRCLE 567 ON READER SERVICE CARD

JES

HARDWARE SOLUTIONS

CD Tower & Jukebox Servers for All Operating Systems

- Plexor 4X, 6X, 8X, Pioneer 10X, NEC 8X
- Axis 850 CD-ROM server (RISK Processor) for Novell, NT, WIN 95, UNIX(NFS)
- Unlimited user license
- Entire tower appears as a single drive letter
- Complete kit to network your CD-ROM's
- Professional CD-ROM recording kits available

Ask about our line of RAID products

To buy direct, call...

1.800.482.1866
http://www.jescdrom.com

CIRCLE 570 ON READER SERVICE CARD

IMPACT

Eight out of ten PC Magazine subscribers look at these ads!

Advertise Here, Where Brand Specifiers Buy Direct!

Call 800-825-4237 Today!

Source: 1996 PC Magazine Magazine subscriber study

NEED PRODUCT FOR INTERNATIONAL USE?

"Many Models Are IN STOCK Ready For Traveling Or Shipping Abroad."



"All HP Products Sold With Manufacturer's International Warranty."

CALL TOLL FREE 1-800-505-4676

horizon computer group, division of Horizon Trading Company, 1510 H Street NW, Washington, DC 20005 USA, Tel: 202-783-6910, Fax: 202-783-6914, 202-783-4465, e-mail: horizon1@attmail.com, World Wide Web <http://www.tradecompass.com/horizon/computers>
"Horizon Trading Company—Providing Export Services Since 1980"

CIRCLE 572 ON READER SERVICE CARD

Authorized Dealer for:



220 Volt Product:

- Printers
- Computers
- Scanners
- Plotters
- UPS Units
- Surge Protectors

bar coding windows

bar code fonts \$149

Labelworks \$279

wand reader \$229

ccd reader \$295

laser reader \$495

Call for FREE Information

512.219.7768

Fax: 512.219.7769

sales@riversedge.com

<http://www.riversedge.com>

riversedge

CIRCLE 657 ON READER SERVICE CARD

BAR CODE READERS

AMERICAN MICROSYSTEMS

2190 Regal Pkwy. • Euless, Texas 76040 • (817) 571-9015

- FOR PC, XT, AT, PS/2 & TERMINALS:
- ▶ No software changes required
 - ▶ Data appears as keyboard input
 - ▶ Reads Code 39, I-2of5, UPC/EAN, Codabar 11, 93, 128, MSI/Plessey
 - ▶ Auto-discriminates between codes
 - ▶ Accepts WAND, SLOT, MAG STRIPE, CCD, LASER
 - ▶ Easy To Use



BAR CODE PRINTING SOFTWARE:

- ▶ For Epson, OKI, IBM, Dot Matrix and HP LaserJet Printers
 - ▶ Prints Code 39, I-2of5, UPC/EAN, Codabar, 128, 93, 11, MSI/Plessey
- ## PORTABLE READERS:
- ▶ Use as a portable, wedge or terminal
 - ▶ Input Devices: WAND, CCD, or 5V LASER
 - ▶ Real-time clock for date and time stamps
 - ▶ Automatic power off with resume
 - ▶ "Built-in" Inventory programs
 - ▶ 54 key alpha/numeric keyboard
 - ▶ Supports HAYES compatible modems

KEYBOARD WEDGE SOLUTIONS!

Quick Bar Code Scanning... from Your PC!

800 TECHNICAL SUPPORT
30 DAY MONEY BACK GUARANTEE
SAME DAY SHIPPING
2 YR LASER SCANNER WARRANTY ON ALL PRODUCTS

Hand Held Laser Wedge Combo starting at... **\$479**

PSC Quickscan Laser Scanner starting at... **\$349**

Hewlett Packard KeyWand Reader **\$199**

DATAVISION
1-800-317-3440

3 Locations To Support You!
Seattle • Philadelphia • Clearwater
FAX: (215) 396-0325

CIRCLE 574 ON READER SERVICE CARD

POINT OF SALE

POS Bundle \$525
Cash drawer, Epson receipt printer
CCD bar code scanner.

Cash drawers from \$129.00
Epson TM U 200 printer \$229.00
Star SP 212 printer \$259.00
HPC CCD bar code scanner \$169.00
Metro MS951 laser scanner \$299.00
ICVentry \$279.00
POS software from \$149.00
Eltron bar code label printer ... \$475.00
Portable data collectors from \$499.00

BAR CODE/INVENTORY

Label design and printing software w/CCD scanner **\$199.00**
Quick Draw labeling software w/CCD scanner & label printer \$799.00
Bar Code Anything labeling & tracking software w/CCD scanner \$399.00
Backtrack inventory mgmt./asset tracking software w/CCD scanner \$899.00

NurolDirect 800.390.6623
Fax 404.239.9607 Int'l 404.713.2554
<http://www.nurol.com>

CIRCLE 575 ON READER SERVICE CARD

PORTABLE PRODUCTS

YOUR COMPLETE SOURCE FOR BAR CODE AND HANDHELD DATA COLLECTION SYSTEMS

- BARCODE READERS - Keyboard wedge, RS-232, PC, Mac, Most data terminal interfaces
- INPUT DEVICES - Laser, CCD, Wand, Slot, Magstripe - All available with built-in decoder
- PORTABLE HANDHELD READERS - DOS & Windows Application Generators - No programming experience needed. Develop your Application in minutes.
- Printers, Verifiers, Label Software, Labels, Plug-N-Play RF Systems, Wireless PDA's

FREE UNLIMITED 800 TECH SUPPORT
UNCONDITIONAL SATISFACTION GUARANTEE
CALL FOR FREE CATALOG
1-800-849-0958
<http://www.portableproducts.com>

PORTABLE PRODUCTS

8401-K Mayland Drive • Richmond, VA 23294
phone 804-346-0111 • fax 804-346-0196

CIRCLE 658 ON READER SERVICE CARD

Bar Code Headquarters

Labeling Software

For LaserJet, DeskJet, etc.

For Windows
and DOS!



- Any Format, Any Label. WYSIWYG Design
- Formats for Sears, K-Mart, Penney's, WalMart, TCIF, Logmars, EIA, AIAG, etc.
- Prints Bar Codes: UCC/EAN-128, Code 128, UPC/EAN, 2 of 5, MSI, Codabar, Code 39
- Simple Custom Operator Interface
- LabelRIGHT™ for Windows™ - \$295
- LabelRIGHT™ for DOS - \$279

Bar Code Fonts for Windows™

- Insert bar codes into any font based Windows program by Clipboard or Hot Key.
- Prints UPC/EAN, UCC-128, 128, 2of5, Codabar, Code 39
- For dot-matrix and laser printers - \$199

Bar Code Readers

for PC, XT, AT, PS/2, Mac
and RS-232 Terminals



- Attaches as Second Keyboard
- UPC/EAN, Code 128, 2 of 5, MSI, Code 39
- Wand, Magstripe, CCD, Slot Badge or Laser
- Superior Read Rates. Made in USA.
- Top Rated by Independent Reviews
- Complete Reader with Wand only - \$329
- Complete Integrated Laser Scanner - \$655

Portable Bar Code Readers

for IBM, Macintosh, and
Serial Interface Computers

WITH
VOICE!

- Battery Operated Reader — 64K or 256K
- Kybd or Serial Intf.
- Display messages & voice messages prompt operator.
- Pick lists, tables.
- Wand, CCD or Laser Scanner
- UPC/EAN, 128, 2of5, MSI, Code 39, etc.
- Very Easy to Create Custom Prompts
- Small Size-Weights only 12.5 oz.
- 64K Complete with Wand & Voice - \$799
- 64K unit with Integrated Laser - \$1299 New



Radio Frequency Terminal



- Covers 1,000,000 Sq. Feet
- 1-16 Terminals/Base
- Controlled by any Program that Reads and Writes to Serial Port
- Voice Messages Too!
- Bar Code Input by Wand, Laser or CCD
- 6.3" x 3.3" x 1.25", 14 oz.
- Base Station - \$840
- Complete Terminal with Wand Scanner - \$1255
- With Integrated Laser Scanner - \$1790 New

We're not Just a Dealer!

WE'RE THE MANUFACTURER, SO YOU GET:

- Better pre-sale Advice
 - Better post-sale Support
 - Same Day repairs when needed
- FULL SELECTION OF SOLUTIONS**
- From Simple wedge to Portable Batch to RF Wireless plus Bar Code Software

Ordering is Easy!

- Made in the USA ■ "800" Tech Support ■ 30 Day \$ Back Guarantee
- Qualified P.O.'s Accepted ■ 2 Year Warranty on Readers
- Same Day Shipping
- Free UPS Blue in US
- Direct from the Manufacturer

WORTHINGTON
DATA SOLUTIONS

Europe Phone: (353) 1 6614 566 • Europe Fax: (353) 1 6614 622 USA Phone: 408-458-9938 • USA Fax: 408-458-9964

800-345-4220

CALL FOR FREE
CATALOG AND
BAR CODE
PRIMER!

BAR CODE

PSC Quick Scan laser w/keyboard wedge reader
\$419

2 8" CCD with built-in
Keyboard wedge reader

\$219

- Portable data collector
- 128K RAM (expand to 256K)
- 4 x 20 LCD, Alpha-numeric keypad
- Real-time clock for time stamp
- Uploads through RS-232 or keyboard
- PC based program generator



- 30 day money back guarantee
- Free phone support
- Please call for a free catalog
- Dealer's discount available

800-765-2271

IBS-Intelligent Barcode Systems

16031 Kaplan Ave., City of Industry, CA 91744
Tel: (818)968-6265 • Fax: (818)968-5527
Internet: <http://www.barcode.com>

CIRCLE 576 ON READER SERVICE CARD

BarCode
DISCOUNT
WAREHOUSE, INC.

Will Beat Any

Advertised Prices for
Comparable Merchandise

CCD Scanner \$183 - Built-in decoder - Includes AT or PS2 cables	Metrologic 951/47 Laser Scanner \$295 - With built-in wedge - Includes AT or PS2 cables
---	--

EZBarcode SerialWand	\$149
EZBarcode RadioWand	\$485
Star SP212PC PD Receipt Printer	\$245
MMF EC200 Cash Drawer	\$180
Logic Controls CR2100S Cash Drawer	\$169

1-800-888-2239
Phone (216) 826-0283
Fax (216) 826-0653 • email: bcow@cofl.com
8862 Engle Rd #204A • Middleburg Hts., OH 44130

CIRCLE 577 ON READER SERVICE CARD

Retail Store Point of Sale

Need Inventory Control ???

Inventory programs for Retail Stores, Auto Parts, Tire Dealers, wholesale and mail order businesses. Asset Inventory tracking, equipment and tool tracking and hospital

\$489.00

Inventory control, writes invoices, purchase orders, updates inventory. Fast search and browser, stock reorder listings and reports. Prints sales analysis and register, and cost of goods sold reports

Cash drawers
Tape receipt printers
Barcode scanners
Customer pole displays

Accounts Receivables, Customer Database programs, General Ledger, Accounts Payables, Barcode printing programs for DOS and Windows

800-426-6588

Freeman Software
409-C E. Centerville Rd.
Garland, TX 75041
214-840-0906 Fax 214-271-3808

ScanMart, Inc. (800)221-6567

fax (817)868-0012

METROLOGIC

PSC

OPTICON

CIPHER LABS

LASERS

from \$229

CCDs

from \$109

SLOT READERS

from \$129

WANDS

from \$39

MAG STRIPE

from \$119

DECODERS

from \$99



Call for Free Catalog!



30 Day Money Back Guarantee

Voice Mail Cash Machine



Earn thousands of dollars monthly with your 486. Answer a home-office phone, rent pagers, accept mail orders, and collect your cash by debit, credit cards, passwords, or a 900 number. Profit now! Order our 200 page Voice Venture Guide loaded with startup ideas & tips! (\$50 - applied on future purchases.)

Start A Home Business Today

Kis'n'Tel
Matchmaking/
live chatline

Speak'n'Sell
Classifieds fax
voicemail, paging

From \$1996. (Ask about 0% interest financing!)

ElderChek
Senior citizen/
kid monitor

TollBridge
Sell long distance
and debit cards

VoiceWorld
The Choice For Voice

Questions?
602.922.5500

8502 E. Via de Ventura, 220
Scottsdale, AZ 85258 USA

http://www.voiceworld.com

CIRCLE 583 ON READER SERVICE CARD

PSC
Metrologic
608444-004

symbol

PERCON

Videa
Strand

BARCODE CATALOG

FREE

COMPASS
Web Site Adapter

DATAMAX

CHERRY

HAND HELD
PRODUCTS

Zebra

HEWLETT
PACKARD

88 PAGES WITH 1000'S OF BRAND NAME PRODUCTS

* NEW EQUIPMENT AT DISCOUNT PRICES * SAME DAY SHIPPING

* 30 DAY NO-HASSLE MONEY BACK GUARANTEE * TOLL FREE TECHNICAL SUPPORT

COMPLETE KITS • FONTS • ID GUIDE

SCANNERS • RF • PORTABLE READERS

OCR • FULL-PAGE SCANNERS • SOFTWARE

SYSTEM

WAREHOUSE

SPECIAL APPLICATION PRODUCTS

CASH REGISTERS • RIBBONS • FONTS

LABELS • PRINTERS • AND MUCH MORE

\$49 FONTS

BARCODE FONTS

ANY ONE FOR \$49, ALL-599

Code 39 • Extended Code 39 • UPC-A

UPC-E • EAN/JAN • Interleaved 2 of 5

Code 128 • Codebar • Code 93

MSI Plessey • PostNet Fonts

\$95 LABELER

Design & Create Your Own Labels: Barcode Labels, Address Labels...

Features:

- Full Desktop Publishing
- Input Files & Graphics
- 360° Text & Graphic Rotation
- Supports all BC Symbolologies

\$99 STARTER KIT

Create...Scan...Learn Complete Starter Kit:

Includes:

- WAND
- DECODER
- BARCODE FONTS
- BARCODE BOOK

CALL 800-397-9785 or 214-516-1100

1401 Capital Ave. Pkwy. TX 75834

Internet Address: http://www.systems.com

CIRCLE 579 ON READER SERVICE CARD

Free Offer

Manage PCs

Download a complete, free trial copy of WinBatch 96.

<http://www.windowware.com>

This macro language manages all your PC systems, Windows applications, and network solutions. Includes software for every Windows version.

WinBatch is \$99.95 (with a compiler it's \$495). No-hassle, 90 day, money back guarantee.

Wilson WindowWare
info@windowware.com

1.800.938.4590

Office: 1.206.938.1740

Fax: 1.206.935.7129

CIS: GO WILSON, Sec. 15

CIRCLE 584 ON READER SERVICE CARD

NOW AVAILABLE

SuperDisk-NT for Windows NT

Software RAM disk

Unleash I/O performance by using system memory to relieve I/O bottlenecks.

Runs on Intel, Alpha, MIPS or Power PC systems.

Call today for FREE demo

1-800-388-TURBO

Visit our web site:

<http://www.eecsyst.com>

327 Boston Post Road
Sudbury, MA 01776
FAX: (508) 443-9997

CIRCLE 580 ON READER SERVICE CARD

America's most popular, most complete, and most affordable solution for the mail order business—order entry/review, credit card processing with draft capture, UPS manifesting, profit analysis, accounting, telemarketing, list management. Clipper compiled, dBase III + files. Single and Multi-user versions. Find out why more people buy MOM after comparing! Demo kit \$25 refundable deposit.

MailOrderManager

Dydacomp Development Corporation
150 River Road, Suite N1, Dept. PCM
Montville, NJ 07045

1-800-858-DYCOM



CIRCLE 581 ON READER SERVICE CARD

Free On The Internet

Start to reduce or eliminate FAX costs today!

Send faxes via the Internet for free!

Download free shareware at:

<http://www.tacsyst.com>

CIRCLE 582 ON READER SERVICE CARD

Create a killer Website!



Website - Web Server

Easily set up your company server. Website is for any one who wants to publish information on the Web or on a corporate LAN running TCP/IP. In a corporate LAN use Website to publish company reports, news, and updates. On the Web, market and sell your product or service to a HUGE market. Only \$169



Offer online conferencing on your Website! Add interactive conferencing to your Website. Easily setup a medium where people can engage in conversations on your site. Your product could be the top rated business opportunity. Only \$139

For more info on these or other cool Internet Products call or visit us online at www.NETSITEINC.COM. Order online and save 5% off your order!

1.800.292.4059

NETSITE Internet Products

CIRCLE 585 ON READER SERVICE CARD

Off Campus Degree Programs

Earn your B.S., M.S., or Ph.D., in *Computer Science* or *Business Administration* through Home Study.

Credit for Life Experience Awarded

No on Campus Requirements

Study at Your Own Pace

Affordable Tuition

Plans Available

Licensed and Accredited



Columbia Southern University

Call For Free Catalogue
1-800-977-8449 Ext. 55

Home Study ACCREDITED B.S. DEGREE in Computer Science

Easy-to-study lessons in Multimedia, C, C++, Visual Basic, Assembly Language, Unix, Database Design, Cobol, Ada, Pascal, & many more lead to the only home-study BSCS degree accredited by an agency recognized by the U.S. Department of Education.

Professional software & hardware provided at no extra charge. Programs in Computer & Electronics Engineering Technology as well, all accredited by the Distance Education and Training Council and VA Approved. Our 46th year.

Free Catalog: 1 (800) 955-2527

GRANTHAM College of Engineering

Grantham College Rd., Slidell, LA 70469-5700



Take the BLAHs out of Church Publishing!

The most Christian clipart ever! 1000+ new, professionally drawn Christian images Old & New Testament, Church Activities, Christian Symbols, Maps plus more.

Great for your bulletins, newsletters, desktop publishing, Sunday School, books, greeting cards, etc.

Christian ClipArt CD-ROM™

Only \$49.95 + \$5 Shipping (US only)
All Major credit cards

800-729-9500

or send check or money order to
Ellis Enterprises, Inc.
4205 McAuley Blvd. #385,
Oklahoma City, OK 73120
Fax: 405-751-5168
<http://www.christianclipart.com>
Runs on Win95/Win 3.1/DOS/MAC etc.

CIRCLE 587 ON READER SERVICE CARD

Powerful Protection, Affordable Price

The UniKey® Anti-Piracy System

- Reliable hardware key
- Secure protection for multiple applications/versions
- The industry's only patented protection technology
- Protects applications quickly, without programming
- Remote update capabilities
- DOS/Windows/95/NT/Unix/NetWare support
- Time/date-based execution control
- Made in U.S.A.

Free UniKey Test Drive! Call:

800-841-1316

**SOFTWARE
SECURITY**

6 Thorndal Circle, Darien, CT 06820-5421
(203)656-3000 FAX: (203)656-3932
<http://www.softsec.com>

CIRCLE 589 ON READER SERVICE CARD

Gain Access to the World of Smartcards

In an increasingly wired world, thousands of profitable smartcard applications are just waiting to be developed, in a wide variety of fields - banking, security, telecom, education, healthcare and more.

To seize this opportunity and create successful smartcard applications, all you need is ASE™ - **The Aladdin Smartcard Environment.**

ASE is an integrated, PC-based development environment that gives developers an efficient, flexible and secure tool for making the most of this exciting new technology.

The quickest, easiest, and most effective introduction to the world of smartcards is the ASE Developer's Kit. Each Kit is a comprehensive package containing everything you need to get acquainted with ASE.

North America

NY 212-564 5678, Fax: 212-564 3377, E-mail: ase.sales@us.aks.com
Chicago 847-808 0300, Fax: 847-808 0313

Int'l Office

Germany

United Kingdom

Japan

+972-3-636 2222, Fax: +972-3-537 5796, E-mail: ase.sales@aks.com

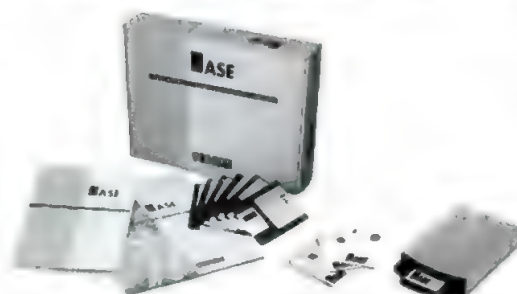
+49 89 89 42 21-37, Fax: +49 89 89 42 21-40, E-mail: info@fast-ag.de

+44 1753-622266, Fax: +44 1753-622262, E-mail: sales@aldn.co.uk

+81 426-60 7191, Fax: +81 426-60 7194, E-mail: aladdin@po.iijnet.or.jp

Distributors located worldwide - call for details!

© Aladdin Knowledge Systems Ltd. 1985-1996 (1996 ASE™ is a trademark of Aladdin Knowledge Systems Ltd. All other names are trademarks of their respective owners.)



The ASE Developer's Kit includes ASEDrive, a versatile smartcard drive; ASESoft interfaces and utilities; and various types of ASE Cards.

To gain access to the world of smartcards - order your low-cost ASE Developer's Kit today!

1-800-223-4277
<http://www.aks.com>

ALADDIN

The Professional's Choice

CIRCLE 588 ON READER SERVICE CARD

CrypKey

Software Licensing System

Software Protection with NO hardware lock and NO disk key

CrypKey is software copy protection that is:

CrypKey can increase your software sales:

- completely secure from any diskcopy program
- perfect for CD-ROM or Internet distribution!
- cost effective user friendly, easy to integrate, easier to support, 100% guaranteed to satisfy!
- upsell options and levels of your software
- lease or demo your software by runs or time
- enable or update your customers anywhere in the world by phone, fax, or email!

New! unique Ready-To-Try feature - upon installation allows 1 trial period only per customer.

New! unique Add-On feature- add more options, levels, run, or time to existing licenses.

New! CrypKey Instant: protect your software yourself in 5 minutes with no source code changes.

CrypKey is completely compatible with MSDOS, MS Windows 3.x, Win32s, Win 95, Win NT, and manages network licensing on all Novell and Microsoft operating system based networks.

CrypKey is produced by Kenonic Controls Ltd., software and engineering since 1972.

Kenonic Controls Ltd.

7175 - 12th Street S.E.

Calgary, Alberta, Canada T2H 2S6

Ph.(403)258-6200 fax:(403) 258-6201

Internet: crypkey@kenonic.com

WEB: <http://www.kenonic.com/crypkey.htm>

CIRCLE 990 ON READER SERVICE CARD

Computer Insurance



Sure It's Insured?

Our Computerowners^(sm) Policy insures your computers against theft, fire, accidental damage, natural disasters even power surge! Annual premiums start at \$49 for up to \$2,000 of equipment. Call now for information or coverage!

1-800-SAFEWARE

1-800-800-1492
Available in the US and Ontario.

SAFEWARE,

The Insurance Agency Inc.
5760 N. High St., PO Box 656
Columbus, OH 43085-3978

CIRCLE 595 ON READER SERVICE CARD

Data Recovery

Novell, DOS, Windows 95, MAC

ECO Electronics, Inc.
The data recycling center

ECOnomically and ECOlogically the place to send your hard drive, removable media, and/or floppy diskettes!

No Evaluation Fees
24 Hour Service Available
17 Years Experience
Competitive Pricing

Over 5000 Systems - 500+

800-339-3412 • 407-691-0019
407-691-0014 Fax

4115 Burns Rd., Palm Beach Gardens, FL 33410

CIRCLE 596 ON READER SERVICE CARD

Don't Choose Static Be Pragmatic!

Unlike ASIC dongles from our competitors, only the Marx CRYPTO-BOX™ Dongle has an advanced dynamic algorithm built into its programmable microprocessor.

Marx's dynamic algorithm can continually change — making it virtually impossible for pirates to decode its protection and copy your protected software.

Not only does the Marx dynamic algorithm provide higher security read/write memory, but it also encrypts and decrypts data faster — so your software runs faster!

Check out the superior Marx CRYPTO-BOX and find out why it's the best-selling microprocessor-based dongle in all of Europe.

MARX Intelligent Innovations
Since 1985
INTERNATIONAL INC.
10000 Highway 100, Suite 100, Irvine, CA 92618
Fax: 714-263-1549

1-800-627-9468

Fax 404-321-0760

Visit our Web Site: <http://www.marx.com>

CIRCLE 591 ON READER SERVICE CARD

3DSTUDIO SURFCAM

RAINBOW SENTINEL LOCKS
MASTERCAM TRADESTATION
FEAR NO HARDWARE LOCK
Lock Removal Experts

IMAGINE THAT

2730-Q US 1 South
St Augustine, FL 32086

904-797-6600/L.O.C.K. fax

CIRCLE 593 ON READER SERVICE CARD

DATA RECOVERY

Lost your data? Don't panic CALL!

800-886-2231

No Data... No Charge

- ✓ 24-hour
- ✓ weekend
- ✓ priority
- ✓ on-site

- Virtually every operating system
- Competitive prices
- Clean-room facilities

DATA MECHANIX, 18271 McDermott Street, Suite B, Irvine CA 92714
PHONE: 714-263-0994 FAX: 714-263-1549

CIRCLE 596 ON READER SERVICE CARD

SOFTWARE SECURITY

Az-Tech Software, Inc.
Leaders in Software Security

EVERLOCK
(Software Based)

SAFE-D
(Secure Distribution)

EVERKEY
(Hardware Based)

Phone: (816) 776-2700 x346

Fax: (816) 776-8398

Department: SMO-346

Internet: www.az-tech.com

E-Mail: sales@az-tech.com

POWER BIOS

ADD ENHANCED IDE CAPABILITY!

- ✓ Power BIOS is an add-on card with an EIDE/LBA BIOS.
- ✓ Upgrade to EIDE/LBA without throwing away your IDE controller!
- ✓ Very Easy Installation!
- ✓ Lets you use new hard disks of up to 8 gigabytes!
- ✓ Compatible with Win 95, OS/2!
- ✓ Multi-sector read/write up to 30% speed-up!
- ✓ Auto-detection of up to 4 hard disks!
- ✓ Auto-partitioning of new hard disks!
- ✓ Virus detection!

Vendors, Reseller Wanted!
Fax using Company Letterhead to

(65) 281 1586

Storage Technologies International
www.singnet.com.sg/~bluesky/storage.html

CIRCLE 594 ON READER SERVICE CARD

MICRO COM

WHEN YOU ABSOLUTELY, POSITIVELY HAVE TO GET YOUR DATA BACK...

*FREE DIAGNOSTIC EVALUATION
Some restrictions may apply

www.mcrecovery.com

800 469-2549

19011 Ventura Blvd. Tarzana, CA 91354-7417 • 818/881-8015 Fax

CIRCLE 597 ON READER SERVICE CARD

CIRCLE 50 ON READER SERVICE CARD

www.divar.com

WWW.FREEBBB.COM

2462 WAYNOKA ROAD COLO SPRINGS, CO 80915 • 719-388-1616 • 719-388-7022 • <http://usg.net/Introsal>

CIRCLE 603 ON READER SERVICE CARD

CIRCLE 604 ON READER SERVICE CARD

CIRCLE 501 ON READER SERVICE CARD

817-681-6212 Fax 817-681-7754

Abstract

DISKETTE DUPLICATION FROM \$3.49

HIGHEST QUALITY MEDIA

- 3.5" and 5.25" Formats
- Custom Labels/Shutter Printing
- Diskette Mailers/Accessories
- Assembly Services
- Bulk and Formatted Diskettes
- Generous Volume Discounts

CD ROM Duplication

- Pre-Mastering Services
- One-off/Small Volume Runs
- Large Volume Replication
- Packaging Accessories
- Blank CD Media 63 & 74 Min.

800-255-3142

Diversified Systems Group, Inc.
P.O. Box 1114
Issaquah WA 98027

CIRCLE 612 ON READER SERVICE CARD

Total Project Management for Software Manufacturing and Information Distribution

- Diskette & CD-ROM duplication services
- Online information distribution services
- Authoring & electronic publishing services
- Bulk media sales (brand & generic)
- On-demand printing (manuals, mailings, etc.)
- Packaging, assembly & distribution
- Duplication equipment sales & servicing

100% guaranteed! Superior quality, fast turns & best pricing



Servicing the corporate and software communities since 1983

819 Highway 33 East, Freehold, NJ 07728

Tel: 800 MEGASOFT Fax: 908 462-3658

Internet Worldwide Web: <http://www.megasoft.com>

CIRCLE 608 ON READER SERVICE CARD

WEB HOSTING FROM ONLY \$25!

Now getting your site onto the web is easier and more affordable than ever.

Netlantic Online Services is offering server space from only \$25 per month. You get 5 megs of space and 10,000 free hits per week. Extra space is available for just \$2 per meg per month, and extra traffic is billed at only \$10 per 10,000 extra hits per week. Our friendly, expert staff will get you set up for a one-time \$50 fee, and then you're ready to roll!

But you get more than just a place to host your site. Secure transaction capability, detailed usage statistics

and FTP access to your directory are included in our low price. Your site will be available to every user on the Internet from our high-speed, mirrored servers - hooked up to a T1.

Contact us today by phone or e-mail at netlantic@cityscapes.net

Call toll free
1-888-782-8881

netlantic
ONLINE SERVICES LTD.

CIRCLE 609 ON READER SERVICE CARD

Affordable DISKETTE & CD-ROM Duplicating Equipment

MAKE YOUR OWN COPIES!

- Simple to Use.
- Super Reliable.
- A Snap to Set Up.
- Easily Pays for Itself.
- Free Media With Your Equipment Purchase

BULK DISKS/CD-R'S

Verbatim • Dyson • TDK

DISKS: 3.5 LD or HD

Qty:	250+	1000+
Blank	.35	.32
Formatted	.42	.38
CD-R's: 63 or 74 Min	25+	100+
Taiyo Yuden	8.29	7.29
TDK	8.99	7.99

1101 Richmond Ave., Pt. Pleasant Beach, NJ 08742

CIRCLE 611 ON READER SERVICE CARD

**WE CAN ALSO DUPLICATE
CD'S AND DISKETTES FOR YOU**
24 hour turnaround. Custom labels & packaging. Highest quality media. Total Quality Assurance.

800-426-0247

Fax (908) 892-6186

**PRINCETON
DISKETTE**

AUTOMATIC DUPLICATION EQUIPMENT

for:
Diskettes
CD-R
PCMCIA Cards



\$1695

Over 10,000 UNITS INSTALLED!

Leasing Available

CALL: 1-888-723-3475

510-373-6060

Champion
Software Duplication Systems

CIRCLE 615 ON READER SERVICE CARD

FOREVER! IS A LONG TIME

mitsui CD-Recordable Media Stands the Test of Time.

- Highest Proven Durability Against Heat, Humidity & U.V. Light
- LIFETIME Warranty - Longest in the Industry!
- Best Choice for Pre-Mastering, Archiving and Music Recording
- 63 Min (580mb) & 74 Min (680 Mb) in Stock for Immediate Delivery
- Complete Selection of CD-ROM Recorders and Mastering Software

Silk Screening Available With Your Company Logo!

800-454-0100



AMC DISTRIBUTING

The Multimedia Solutions Source
P.O. Box 3456 • Redmond, WA 98073
206-882-0587 • FAX 206-861-8391

Purchase Orders Accepted from Rated Firms and Government Agencies.

CIRCLE 610 ON READER SERVICE CARD

Your One Stop Shop!

CD Duplication
3.5" & 5.25" Diskettes
Package Design
MultiMedia Design
Software Manuals
Product Warehousing
Product Fulfillment
& Distribution



DupliSoft, Inc.

800-554-3873

<http://www.duplisoft.com>

VISA, MasterCard & AMEX accepted

CIRCLE 613 ON READER SERVICE CARD

DUPLICATION from 10¢

For 3.5" Diskettes & CD-Roms
Custom Packaging Available!

3.5" Bulk Diskettes IBM Formatted

Black - Colored - Translucent
22¢ 23¢ 28¢
10 pcs/pack or 25pcs/pack Available

3.5" OEM/Duplicator Disks

Black - Colored - Translucent
26¢ 27¢ 31¢

All Diskettes are 100% Certified; Error-Free
Please call for Quantity Discounts!!

Diskette Plastic Holders: 1- 10pcs
CD-Rom Jewel Cases/Sleeves
Diskettes / CD-Rom Mailers
Custom Imprinting Services
Duplicators, Distributors, Govt. PO Welcome!!
Call for Catalog/Orders
1-800-583-5833
415-583-9933 Fax 415-583-9932
Promedia Computer Supplies
432 No. Canal St. #1 S.S.F. CA 94080

CIRCLE 618 ON READER SERVICE CARD

**DISKETTE & CD
DUPLICATION
EQUIPMENT**

For in-house
duplication,
MediaFORM
is the source.

40+ Disks/Hr. \$1995
120+ Disks/Hr. \$2395
150+ Disks/Hr. \$2795
240+ Disks/Hr. \$3695
300+ Disks/Hr. \$4695

MediaFORM™
800-220-1215
610-458-9200 • Fax 610-458-9554
LEASE & RENTAL PLANS AVAILABLE

**Mouse
Pads**

Custom
Printed
● Your Logo
Design
● Fast
Turnaround

Plastic
Cloth

● Guaranteed
Quality
MicroStore™
800-962-8885
FAX: 507-665-2604 LE SUEUR, MN 56058
**Wrist
Supports**

CIRCLE 621 ON READER SERVICE CARD

GLOBAL
11 Harbor Park Dr. Dept. PCM1
Port Washington, NY 11050

**FREE
GLOBAL
CATALOG**

100 Page guide to
**Hardware &
Software**

**Dial Toll-Free
1-800-8-GLOBAL**

CIRCLE 625 ON READER SERVICE CARD

The Fastest
Turnaround! ★ ★ ★ High Quality
Media!

**DISKETTE
DUPLICATION**

Count on our Reliable, Worry-Free Service!

**SOFTWARE
PACKAGING SUPPLIES
& FULFILLMENT**

Printed Sleeves, Labels, Vinyl Pages,
Mailers, Licence Agreements,
Shrink Wrapping, Mailing, etc.

**CD-ROM MASTERING
& DUPLICATION**

One-off CD, Small and Large
Volume duplication and Packaging

MEDIA CONVERSIONS

2500 Word Processing Formats,
Disks, 9-Tracks, 3480, Colorado, QIC-80,
8mm, 4mm DAT, TK50, OCR Scanning

BLANK DISKS/CD-ROM's
Will beat any advertised price!
COMPANY COMPENDIA Inc.
1-800-374-DISK
Ph: 312-419-8771 Fax 312-419-1390

CIRCLE 616 ON READER SERVICE CARD

Bob's Mail List Company

**Dress Your Disc
For Success**

The Perfect Image™ CD-R Printer:

- Eliminates adhesive labels
- Prints on lacquer or matte finish media
- Laser quality 300 dpi print
- 10-20 second print speed

800.880.8240 EXT. 6017

R IMAGE™
612.944.8144

CIRCLE 619 ON READER SERVICE CARD

HP, IBM, Canon, Epson, Apple, NEC

TONER

Cartridge Remanufactur-
ing For Laser Printers

Price From
\$45
Free P&H & Delivery

**MICR Toner, Fonts, Software
For Check Printing**

**ADVANTAGE
LASER PRODUCTS, INC.**
1-800-722-2804
2030 Powers Ferry Road, Suite 230
Atlanta, GA 30339
On the web at <http://www.advlaser.com>

CIRCLE 622 ON READER SERVICE CARD

**SEATTLE
DISK**

**QUALITY
3.5" DISKETTES**

HD & DD \$0.19 to \$0.39ea (ED \$0.99ea)

- Duplicator Grade
- Duplication Services
- Brand Label or Unlabeled
- Custom Labels & Application
- 10 & 50pk-Quantity Discounts
- Tested and Certified 100% Error Free
- M/C, Visa & PO on approved credit

**800-482-DISK
(24 hours)**

Manufactured for major brand disk companies since 1988.
SEATTLE DISK, PO Box 1580, Mukilteo, WA 98275
(206)347-9000, 742-6690, Fax: 355-0195
e-mail: seadisk@aol.com

CIRCLE 626 ON READER SERVICE CARD

**Design, Print and
Apply CD Labels
for \$79⁹⁵**

That's
NEATO!

NEAT
CD LABELER KIT

1 **DESIGN** your own artwork On Your Computer
with easy-to-use NEATO Templates

2 **PRINT** on Any Laser Printer using NEATO
pressure sensitive die-cut labels

3 **APPLY** labels using the NEATO Label Device
PERFECTLY EVERY TIME!

KIT INCLUDES • Label Design Templates (PC & Mac)
• The Amazing Neato Labeler • Instruction Guide

800-984-9800
MicroPatent™ 200 Village Ave • East Haven, CT 06512
203-466-5170 • Fax 203-466-5170
In Europe +44 (0)999 561474 • Fax +44 (0)187 932 0480
See us at: <http://www.neato.com>

CIRCLE 617 ON READER SERVICE CARD

**The Ultimate
Desk**

YAHOO

CAN-AM
The Look of Leather
The Strength of Steel
800-387-9790
<http://www.io.org/~canam>

CIRCLE 620 ON READER SERVICE CARD

JetMaster Save \$50 on Printing Costs

**Re-Usable Ink
Jet Refill System**

Lowest cost per recharge in the
world. Buy kit, later just buy
additional ink, which is available
in 2 oz., pint, and gallon size
Costs as low as \$1 per recharge
Waterproof inks available
Most Inkjet printers supported

BPA (StyleWriter Canon BubbleJet)	\$29.95
IMO (HP 500 Series)	\$9.95
IMO-MCI (HP 500 Series Black/Color)	\$69.95
IMO-MCI-600 (HP 600 Series Black/Color)	\$69.95
BIG-MCI-600 (Canon BK-600)	\$19.95
BIG-MCI-2400 (Canon 3000-1100)	\$49.95
Black Jet Ink (2 oz.)	\$10.50
Color Jet Ink (2 oz.)	\$11.50

Order Toll Free **1-800-547-3333**

Computer Friends, Inc.
<http://www.teleport.com/~cfriends/>
E-Mail: cfriends@teleport.com
Tel. (503) 626-2291 Fax (503) 643-5379

CIRCLE 623 ON READER SERVICE CARD

VIZIFLEX SEELS

YOUR NO.1 SOURCE
FOR COMPUTER SKINS
AND DUST COVERS

■ Viziflex Seels eliminates the problem
of dirt, spills and other contaminants
on your computer keyboard.
Over 3,000 configurations available.

■ Need a customized cover?
Viziflex can make 'em.

Contact us for a FREE catalog packed with
many unique computer accessories.

1-800-30SEELS
VIZIFLEX SEELS, INC
16E Lafayette Ave., Hackensack, NJ 07601
(201) 487-8080 (201) 487-6637 Fax
email: Viziflex@AOL.com

CIRCLE 627 ON READER SERVICE CARD

LIVE LIVE LIVE LIVE LIVE



C L U B L O V E

ADULT PLAYGROUND

The internet's premiere adult playground. Watch LIVE strip shows. Interact with TOP adult stars in our erotic LIVE Fantasy Booths. Access first-run or fetish films, interactive photo features, magazines, chat rooms, the Net's largest adult mega mall & much more.

CHECK IT OUT!
<http://www.adultplayground.com/pcm>

MUST BE 18+

CIRCLE 629 ON READER SERVICE CARD

RAW HIDE

Hottest Girls in
Dallas Get Erotic
For You Live
Like You've Never
Seen Before!

- FREE samples on NET •
- FREE software • Toll FREE Call •
- One on One LIVE ENCOUNTERS •
- Finest Quality Video picture of women that love to show & tell ! •

GET YOUR FREE SOFTWARE
(no registration fee)
Order Line: (214) 658-1503
Download link:
<http://www.wsos.com/rawhide>

HAVE 2 GIRLS
FOR THE PRICE OF 1 !!
AS AVAILABLE

Adults Only.

CIRCLE 632 ON READER SERVICE CARD

**UNCENSORED
ASIAN BEAUTIES
HOT & FREE!**

Over 10 GB of high
quality adult GIFs.
Loads of original content.

UNCENSORED
world-wide live chat.

!! All Free !!

Call now:

011-852-172-94-944**Erotica East**

THE UNCENSORED BBS

Over 18's only.
No credit cards required.
Standard long distance charges apply.

CIRCLE 635 ON READER SERVICE CARD

TALK IS CHEAP


SEEING IS BELIEVING
Talk to and actually see beautiful women
strip LIVE ON YOUR PC just for you.

This is LIVE not a CD.

LIVE GIRLS FREE SOFTWARE

FIRST 5 MIN. FREE TO NEW CALLERS!**24 Hours a Day 7 Days a Week**
<http://www.livecenterfolds.com>

ADULTS ONLY!

CIRCLE 630 ON READER SERVICE CARD

**the
NITE EXCHANGE****MAKE YOUR MODEM SMOKE!**

Gay • Straight • Bi • Swingers

- Ultra HOT Chat
- FREE downloads/E-mail
- Matchmaker
- No hidden charges
- Over 10,000 calls a day
- 40-60% female/male ratio
- Up to 16.8 on 32 lines

1-618-668-1000

*Come wing
with us!*

Regular Long Distance Applies 18+

CIRCLE 633 ON READER SERVICE CARD

Virtual Entropy

EROTIC FEMALE STRIPPERS!
1 On 1-PEEP-2 Girl Shows
Special Adult Film Star Appearances

Modem # 954 984 1001

**FULL MOTION VIDEO
CONFERRING**

THE MALESTOP
Hot Male Strippers
2 Rooms of Fun!

Modem # 954-984-1155 MUST BE 18+

CIRCLE 636 ON READER SERVICE CARD

**the SEXIEST
site on the web!**
HOTCAT ONLINE

<http://www.hotcat.com>

LIVE CHAT! GAMES ADULT FUN GIFS!
CHECK OUT OUR FREE AREA!

SEE BEAUTIFUL WOMEN STRIP LIVE FOR YOU!
FOR A DETAILED RECORDED EXPLANATION CALL 1-800-555-5488

TALK TO OUR HOT GIRLS AT

1-888-666-SEXY \$2.99 per min.
1-888-666-7399

YOU MUST BE OVER 21 YEARS OLD TO USE THIS SERVICE.

CIRCLE 631 ON READER SERVICE CARD

GET NAKED ON THE NET!

KEYSTROKE
YOUR WAY TO A PC
PARADISE WHERE
WILD WOMEN STRIP
LIVE!

No Internet
needed! Dial
1-800-756-8884
FREE Software!

Nothing
Censored!
They'll do
what ever you
tell them -
**ALL IN
REAL
TIME!**

Access to
sexual excess
is just a quick
phone call away!
Or download
from our
website!

www.strippersonline.com

SUPER-HEATED ADULTS-ONLY BBS

011-852-1729-8994

CIRCLE 634 ON READER SERVICE CARD

Love View**Live Video Action!**

Interact with Gorgeous
Naked GIRLS!

It's like having your own Private Strip Club
Without Paying for the Drinks!!!



Download FREE LOVE-VIEW Software from:

<http://www.xccpleasures.com/love.html>

Or Modem to:
954-725-0705

Adults Only 18+

CIRCLE 637 ON READER SERVICE CARD

CIRCLE 640 ON READER SERVICE CARD

CIRCLE 643 ON READER SERVICE CARD

CIRCLE 648 ON READER SERVICE CARD

CIRCLE 630 ON READER SERVICE CARD

CIRCLE 641 ON READER SERVICE CARD

Adults Only 18+

CIRCLE 139 ON READER SERVICE CARD

<http://www.smutland.com>

Must be 18+ To Access

MUST BE 18+. Customer Support Voice Line 415-981-3154

CIRCLE 644 ON READER SERVICE CARD

Set Your Modem to 8-M-1 and Your Terminal Emulation to ANSI
• Adults Only • Local Access Available in over 1000 cities
Throughout the U.S. and Canada • Visit Our WebSite -
www.iaice.com or Telnet to iaice.com • Voice (813) 715-8977

CIRCLE 644 ON READER SERVICE CARD

FREE FREE FREE



IT WILL PUT A SMILE ON YOUR FACE!

MODEM SEX

SEE THE FUTURE

THE ULTIMATE CONNECTION

- UNLIMITED ACCESS
- 100,000 Shareware & GIFs, Windows, Mac and DOS files
- Sexy Network Chat with Singles and Couples
- Unlimited Downloads
- FREE Internet Accounts
- Up to 28.8k on all 188 lines
- New GIF's posted daily by our photographers

LIVE EROTIC VIDEO!

TOP 100 BBS

CALL FROM HOME OR OFFICE:
1-217-792-3663

Must Be 18+ C2 Values Line 95-01-402

CIRCLE 645 ON READER SERVICE CARD

Live Video. Sex with
NAKED GIRLS!!!

See Girls with fulfill your desires in your own privacy!

They take it all off for YOU!!!

1 on 1, 2 on 1, shows, Live Chat - ENJOY IT ALL!!!

Download iVIEW compatible software from:
<http://www.adultsex.com>

or-

via Modem (954) 984 1147

Only 18+

For age 18 & older

HOT ONLINE CHAT



LIFESTYLE ONLINE

#1 SWINGER'S CONTACT SYSTEM
COUPLES & SINGLES
SWINGING/B&D/BIFETISHES

Meet hot contacts online • Sizzling personal profiles • Erotic classified ads • Less than .30¢ per hour

MODEM: 516-689-5390
INTERNET: Telnet lifestyle.com (166.82.150.22)

Pictures hot enough to melt your modem

GRAFIX Super Hot Adult Computer Images at Super Low Cost

Modem: 516-689-2853
Internet: Telnet grafix.com 166.82.150.31

Your Computer Has NEVER Done This Before!

You Control The Action, As A Hot Live Nude Stripper Obeys Your Every Command! Live On Your PC!

FREE SOFTWARE DOWNLOADS
BBS - (619) 793-3041
OR
www.sexvision.com

Must Be 21yrs. old or older

CIRCLE 654 ON READER SERVICE CARD

SEXY EXPLICIT ADULT EROTIC IMAGES!

WARNING! WARNING!

HIGHLY EXPLICIT SEXUAL ENTERTAINMENT!
OVER 100,000 ADULT GIF, SHAREWARE, WINDOWS/DOS FILES-UPDATED DAILY!
FREE UNLIMITED DOWNLOADS!
NO SUBSCRIPTION REQUIRED!

USE YOUR MODEM TO DIAL
011-373-837-1234

INTERNATIONAL LONG DISTANCE RATES APPLY. 18+

CIRCLE 649 ON READER SERVICE CARD

GRAFIX

Computer Images Hot Enough To Melt Your Modem

Go beyond adult to the hottest, kinkiest, most erotic gifs available anywhere. Every file is worth downloading.

Modem 516-689-2853

You must be 18

Super Cheap
Local access from 1000+ cities

Gourmet Gallery BBS

ADULTS ONLY

100% original gifs
Thumbs+Closeups
50 New Pics/Week
14 Online CD-ROMS
14 Gif of Files
16 lines (1200-28.8)

Best Prices in Cyberspace
408-956-5656
telnet 206.40.69.150



Latest Software means...
YOU can actually choose from a menu of **FANTASY GIRLS** and pick the ones you wish to interact with

Visit the Top 3 Adult Websites

<http://www.partytime.com>
<http://www.virtualmona.com>
<http://www.sexmovies.com>

For other action try...
800-FOUR-PLAY
Must be 21 or Over

CIRCLE 655 ON READER SERVICE CARD

It's Hot!

Society Online

- 1000's of Adult Photos
- Nationwide Chat Link
- Unlimited Access

Modem 8, N, I
810-795-3221

MUST BE 18 & UP TO ACCESS

CIRCLE 650 ON READER SERVICE CARD

LA STRIP

Live STRIP CLUB FEED HOT PEEP ACTION ADULT Film Stars* 1-1 & 2-1 Girl Shows* Monthly Unlimited Memberships and much much more!!

*per minute billing

Memberships from \$3.95
THE Ultimate Adult Net CLUB
HOT 24Hrs. A DAY TOLL FREE ORDER 1-888-644-2777

ADULTS Only 18+
Visa/MC and 900 accepted
Free Software and Preview

GIRLS GIRLS GIRLS
www.lastrip.com/hot

CIRCLE 651 ON READER SERVICE CARD

Take A Break on...
Rocky Mountain Playmates

Live one on one Adult Videoteleconferencing on your PC

The hottest nude female Playmates at your command! Download our software and make your fantasies a reality

www.videoplaymates.com
1-800-596-1133 x 9222

Visa | MasterCard | American Express | Discover

Brought to you by RMPT 21+

CIRCLE 653 ON READER SERVICE CARD

Virtually Live

LIVE 101 STRIPPING

VIEW HOT ACTION HAPPENING AT 1 OF 4 ON-LINE STRIP CLUBS

ADULT YELLOW PAGES
MPEG MOVIES
PICTURES
CD ROMS
GAMES
GAMBLING - WIN BIG!!

www.virtuallylive.com
or www.bassix.com
BBS: 604.662.4416
Tel: 1.800.689.8878

(ADULTS ONLY - 18+)

CIRCLE 652 ON READER SERVICE CARD

HARDWARE/BATTERIES

Batteries/Tools for Mobile Executives

Do your "2-hr" batteries only last 15 min? Try our long-life batteries, ac adaptors, car cords & chargers for **Laptop, Cellular, Camcorder**. Largest selection in the country! 1 Yr Wnty. Low prices. Call 800-228-8374 for **FREE** battery guide/catalog.

1-800-Batteries/Power Express

14388 Union Ave, San Jose, CA 95124
Open 24hrs/7 dys 800-228-8374 • F408-879-1969

CIRCLE 676 ON READER SERVICE CARD

DATA ENTRY

The Data Entry Emulator™

Full featured, heads-down data entry with two-pass verification, edit language, output record reformat, operator statistics, batch control, on-line help, free tech support, key from images (NEW!).
For PC, PC LAN, S/36, or AS/400.

Computer Keyes

21929 Makah Road, Woodway, WA 98020
800-356-0203/206-776-6443/Fax: 206-776-7210

LYTEC PRACTICE MANAGEMENT

Advanced practice management for medical, dental, and chiropractic offices.
Versions available for DOS Windows, and a new 32-bit version for Windows 95.
Web: <http://www.lytec.com>

Lytec Systems

7050 Union Park Ctr, Ste 390 Midvale, UT 84047
1-800-735-1991

CIRCLE 684 ON READER SERVICE CARD

DATA BASE

Microsoft Access Power Tools!

Document, analyze, & error-check your databases, spell-check & use rich text in memo fields, develop faster, robust program code, with version control, automate management with routine backups, compacts & repairs. <http://www.fmsinc.com>

FMS, Inc.

8027 Leesburg Pike #410 Vienna VA 22182
Toll Free: 888-220-6234 or 703-356-4700

CIRCLE 680 ON READER SERVICE CARD

RELIGION

CHURCH MANAGEMENT SOFTWARE

PowerChurch Plus for Windows is making church management easy for over 40 denominations. Membership records, contributions, full fund accounting, network support and much more. Call today for **FREE** INFO in the mail.

F1 SOFTWARE

208 Ridgefield Drive, Asheville NC 28806
(800) 486-1800. FAX (704) 665-1999.

CIRCLE 685 ON READER SERVICE CARD

BATTERIES FOR HUMANS

We sell batteries that run longer, recharge more, and perform better. Guaranteed. For cellular, camcorders, photo, laptops, desktops, and more. Also, accessories. Because the human race won't slow down. We are the

#1 BATTERY SPECIALISTS

109 W. 38th St. Floor 11 New York, NY 10018
Call 800-275-2879 Or Fax (212)768-9530

CIRCLE 675 ON READER SERVICE CARD

ENTERTAINMENT/GAMES

PRO FOOTBALL SOFTWARE

Pick NFL winners with WinPicks, the Pro Football Analyst. Includes 1996 schedule, huge stat/trend database, & **FREE** stat updates from BBS or Web. Try our **FREE** demo from Web, plus demos for NCAA football and NBA! \$49.95. VISA/MC.

MICROBROTHERS SOFTWARE

Web: www.microbro.com Fax: 303-465-5278
1630 30th St., Ste. 313, Boulder, CO 80301

CIRCLE 681 ON READER SERVICE CARD

STATISTICAL/RESEARCH

The Survey System - New Version 5.0

Analyzes: marketing, public opinion, customer satisfaction, employee attitude surveys. Handles mail, personal, phone, scanner, disk-by-mail, computer interviews. Records verbatim text/voice answers. Powerful, flexible, user friendly. Free support.

Creative Research Systems

140 Vista View #100, Petaluma, CA 94952-4728
Ph. (707) 765-1001/Fax (707) 765-1068

CIRCLE 686 ON READER SERVICE CARD

COMPUTER BATTERIES & MORE

Batteries for laptop/NB/PB, CMOS, camcorders, cameras, RC vehicles, toys, cordless phones/drills/shavers, cellular, remotes, pet fences. UPS/LANS, Ni-Cads, chargers, etc. **WE REBUILD!** CALL & ASK! **WHOLESALE!** V/MC/AmX/Dscvr/POs.

BATTERY EXPRESS

713 Gladstone St., Parkersburg, WV 26101-5661
800-666-2296/304-428-2296 fax: 304-428-2297

CIRCLE 677 ON READER SERVICE CARD

FOREIGN LANGUAGES/FONT

Foreign Language Software Leader

Largest selection of "Translation, Dictionary, Language Learning, Fonts, Word-Processing, OCR, Etc." from any company! Best prices, Satisfaction Guaranteed! Free 52 pg. Catalog. www.worldlanguage.com

World Language Resources

800-900-8803 Tel 310-996-2300 Fx 310-996-2303
2130 Sawtelle Blvd. Ste 304A L.A. Ca 90025

CIRCLE 682 ON READER SERVICE CARD

TIMEKEEPING

BILLTIME FOR WINDOWS

This time, billing, & tracking software features quick-fill, pick lists, due date monitoring, wip, costs, sales, billing, aging, importing, exporting and much more. Good reviews in June 1996 Issues of CPA Software News & Journal of Accountancy. From \$179.

James Halstead & Associates, PC

1503 Plainfield Rd Joliet, IL 60435
815-729-1900 Fax 815-729-4055

CIRCLE 687 ON READER SERVICE CARD

PERIPHERALS

240volts/50Hz PRODUCTS

•EPSON•HEWLETT PACK. •CANON•OKIDATA•APC
•Dealers inquiries Welcome•Lotus, Microsoft & more available in Spanish, French, Portuguese
•Awarded **EXPORTER OF THE YEAR IN 1994**
•**FREE** Catlg- 30,000 Items - sales@intlhtech.com

International High Tech Marketing

12285 SW 129th Court, Miami, Florida 33186
Tel: 305-254-8731 Fx: 305-254-8736 Call Today!

CIRCLE 679 ON READER SERVICE CARD

MANUFACTURING/INVENTORY

MAINTENANCE MANAGEMENT

PC-based system for the small to medium size business. **FEATURES:** Work Orders (space for detail instructions & safe work procedures), equipment descriptions, historical data, operating & analytical reports, inventory. Write for free Demo!!

PENGUIN COMPUTER CONSULTANTS

P.O.Box 20485, San Jose, CA 95160
800-521-0545 (408)997-7703 Fax (408)927-0570

MEDICAL/DENTAL

DBC Win95 Practice Software

MD's, DC's, DPM's, DDS's, Therapy!
Billing, voice dictation, notes, EMC, scheduling, stats, OLE, and more!
"For the life of your practice!"
Web: www.dbconsultants.com

DB Consultants, Inc.

Tel: 610/847-5065 Fax: 610/847-2298
Email: dondbc@dbconsultants.com

CIRCLE 683 ON READER SERVICE CARD

SERVICES/COMPUTER INSURANCE

Insures Your Computer

The **COMPUTEROWNERS™** insurance policy repairs or replaces hardware, media and purchased software. Rates as low as \$49 a year covers theft, fire, accidents, power surge and more! Call for immediate coverage or info. 1-800-800-1492.

Safeware, The Insurance Agency Inc.

2929 N. High St., PO Box 02211
Columbus, OH 43202 1-800-SAFEWARE

CIRCLE 688 ON READER SERVICE CARD

SOFTWARE/COMMUNICATIONS

ENHANCED FAX SOLUTIONS

FaxFacts™ offers LAN-based Fax from Windows and other fax solutions for business like E-mail/Internet Fax Integration, Mail Merge to Fax, and Graphical Cover Sheet. Supports Windows NT. Demo Call 847/923-3030 Request 889833

Copia International, Ltd.

1342 Avalon Ct., Wheaton, IL 60187
800/689-8898 630/682-8898

MARKETING POWER

Is yours when you place your message in this space. Reach 1,044,227 buyers of all kinds of PC products. Give your business card PC Magazine Marketplace Power.

BusinessCard

Call 1-800-825-4237 today.



Advertising Sales Staff

One Park Avenue
New York, NY 10016
212 503-5100

DISPLAY ADVERTISING

Nancy Newman - Publisher
(212) 503-4453
**Peter Longo - National Associate
Publisher**
(212) 503-3849
Vickie Pinsky - National Sales Director
(212) 503-5651
Ad Coordination Supervisor
Julie Eigo
(212) 503-5107
Advertising Coordinator
Katie Picot
(212) 503-5037

**Frank Quigley - East Coast
Advertising Director**
(212) 503-4564

**Kimberly White - Area Manager
Southeast and New England**
(617) 393-3055

MA, NH, VT, ME, RI, Canada

District Sales Manager
Cameron Brown (617) 393-3058
10 President's Landing, Mystic Center
Medford, MA 02155
Senior Account Representative
Joyce Rossell
(617) 393-3054

CT, NY, NJ, PA

District Sales Manager
Marti Meyerson (212) 503-3703
One Park Avenue, 4th Floor
New York, NY 10016
Account Representative
(212) 503-5112

DE, MD, DC, VA, WV, NC, SC, AL, MS,
TN, AR, KY, GA, FL

District Sales Manager
Andrew Zeiger (404) 814-8950
3405 Piedmont Road NE, Suite 460
Atlanta, GA 30305

NE, WI, IL, IN, KS, MN, MO, MI, IA, ND,
SD, OH

District Sales Manager
Tim Castelli (312) 214-7353
150 North Wacker Drive, 25th Floor
Chicago, IL 60606
Account Representative
Kevin Hein
(212) 503-5011

TX, OK, LA, NM

District Sales Manager
Quin Rodriguez (214) 360-5725
5956 Sherry Lane, Suite 625
Dallas, TX 75225
Account Representative
Amy Cimetta
(212) 503-5675

**Mike Kisseberth - West Coast
Advertising Director**
(415) 578-7809

CA (Los Angeles), AZ, HI

District Sales Manager
R.J. Kirkland (310) 268-1381
11766 Wilshire Blvd., Suite 1550
Los Angeles, CA 90025
Account Representative
Ed Beach
(212) 503-5113

CA (San Diego & Orange County), NV

Senior District Sales Manager
Robin Kofsky (714) 852-5920
18301 Von Karmen Avenue, Suite 330
Irvine, CA 92715
Senior Account Representative
Elizabeth O'Connor
(212) 503-5040

**Mike Klein - Northern California
Area Manager**
(415) 578-7810

CA (San Jose), CO, ID, AK

District Sales Manager
Jennifer Hillis (415) 578-7816
950 Tower Lane, 20th Floor
Foster City, CA 94404
Account Representative
Jordan Klineman
(212) 503-5024

CA (San Francisco & North),
OR, WA, BC

District Sales Manager
Marjorie Scholtz (415) 578-7807
950 Tower Lane, 20th Floor
Foster City, CA 94404
Account Representative
Chris Yates
(212) 503-5047

CA (South San Francisco to
Mountainview), UT, WY, MT

District Sales Manager
Jon Schwartz (415) 578-7813
950 Tower Lane, 20th Floor
Foster City, CA 94404
Account Representative
Lee Siegmund
(212) 503-5161

CENTRAL ADVERTISING

VP, Central Advertising
Robert A. Bader

Sales Manager
Bill Herbst

Production Director
Vicki Egan

Sr. Production Coordinator
Rob Scott

Sr. Production Coordinator
Sherrie Simms

Sr. Advertising Coordinator
Audie Marie Tinoso

ID, MT, NV, OR, UT, WA, WY, AK,
Canada

Account Manager
John Burke
(212) 503-5076

AL, AR, FL, GA, LA, MS, NC, SC, TN, WV,
KY, DE, DC, IL, IN, MD, MI, VA, WI

Account Manager
Alyson O'Regan
(212) 503-5138

CA (213, 310, 619, 714, 805, 818, 909), HI

Account Manager
John Burke
(212) 503-5076

CT, ME, NH, RI, VT, MA, NJ, PA, NY, OH,
Foreign

Account Representative
Brian Gleason
(212) 503-5150

CA (209, 408, 415, 510, 707, 916)

Account Representative
Neil Goldstein
(212) 503-5118

CO, IA, MO, NE, AZ, KS, MN, ND, OK, SD,
NM, TX

Sales Associate
Janet Fu
(212) 503-4579

**Business Card
Advertising**
Call: 1-800-825-4237
PC Magazine Marketplace
One Park Avenue, 3rd Floor
New York, NY 10016

**For more information
regarding *display*
advertising please call:
212 503-5100
1-800-33MAG AD**

**For more information
regarding *central*
advertising please call:
212 503-5115
1-800-825-4237**

IT'S WHAT MAKES YOUR Zip™ RIP.



You'll rip up to 600% faster with a SCSI Zip drive.

You may not know that Zip drives come in two flavors. Zip drives that connect to your parallel port and Zip drives that connect with SCSI. We recommend the SCSI Zip. With an Adaptec® SCSI adapter you could be zipping along up to 600% faster. It's just one more reason to give your PC a SCSI connection. To learn more about Adaptec SCSI connections, starting at \$69.00 (MSRP) call 1-800-804-8886 ext. 2140, or visit our home page at <http://www.adaptec.com>*

adaptec®

*For information by fax, dial 1-408-945-2570 ext. 2140, request document no. 14070.

©1995 Adaptec, Inc. All rights reserved. Adaptec and the Adaptec logo are trademarks of Adaptec, Inc., which may be registered in some jurisdictions. Zip is a trademark of Iomega Corporation.

CIRCLE 218 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://WWW.PCMAG.COM/BuyerLink)

At Home

A SPECIAL REPORT ON PRODUCTS FOR THE PERSONAL SIDE OF COMPUTING



MULTIPLAYER GAMING

What is incredibly addictive, the hottest trend in gaming, and the most overused buzzword since *virtual reality*? It is multiplayer gaming, and it's revolutionizing the computer gaming industry.

Multiplayer games allow you to shrug off the limitations of computerized foes and play against fellow humans.

The appeal? Computers are predictable, humans are not (at least not always).

Until recently, multiplayer games were available to very few people and used static images or long-winded text descriptions of the "action."

TWO OR MORE IS WAR

By Michael E. Ryan

Thanks to DOOM, millions of gaming fans have fallen prey to the addictive nature of fast-paced, graphical (and graphic) multiplayer gaming. But even DOOM limited players to an IPX network or head-to-head modem play. Now even that limitation is about to fall by the wayside.

In this roundup, we look at four online gaming services that take you

into the ether to seek out and destroy fellow game fans from your area and around the country: DWANGO, Kali, Mplayer, and Total Entertainment Network (TEN). Three of the services reviewed here—Kali, Mplayer, and TEN—are

IN THIS REVIEW

DWANGO.....	339	Online Fun for Kids.....	343
Kali.....	343	The Local Multiplayer	
Mplayer.....	350	Connection.....	346
Total Entertainment		Free Net Gaming?.....	353
Network.....	356	In the On-Deck Circle.....	356

Internet-based, while the fourth, DWANGO, uses direct dial-up modem connections. One other service, Engage, was to be included in this story, but it was not yet available for testing (see the sidebar "In the On-Deck Circle...").

Yet another service, Xband PC, was left out at the last minute after its developer, Catapult Entertainment, merged with Mpath Interactive, developer of Mplayer.

We also take a hard look at multiplayer gaming on LANs and the effect these games have on network traffic—

you may be surprised by our findings (see the sidebar "The Local Multiplayer Connection"). We also examine the emerging trend of free Internet gaming (see the sidebar "Free Net Gaming?") and preview Engage and one other online gaming service, this one designed specifically for kids (see the sidebar "Online Fun for Kids").

These are by no means the only services and resources available for gaming online. The ImagiNation Network (INN) has been around for years and continues to offer original-content online games, as well as online versions of a few commercial titles. As we prepared this story, INN was purchased by America Online and was in the process of a ma-

jor redesign and repositioning. In the coming months, INN and its new Cyber Park service could jump right to the forefront of this ever-changing market.

Likewise, most of the major online services offer original-content games, as do several In-

the services were readily available to anyone).

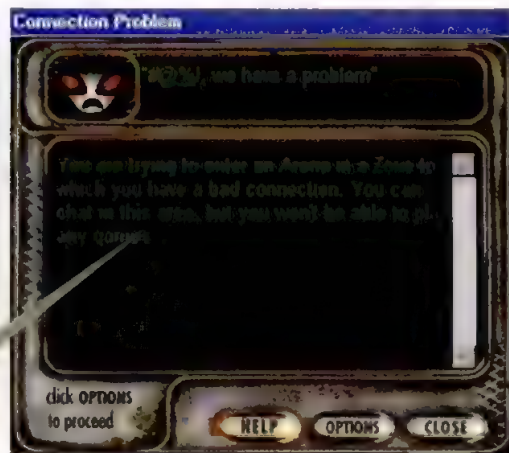
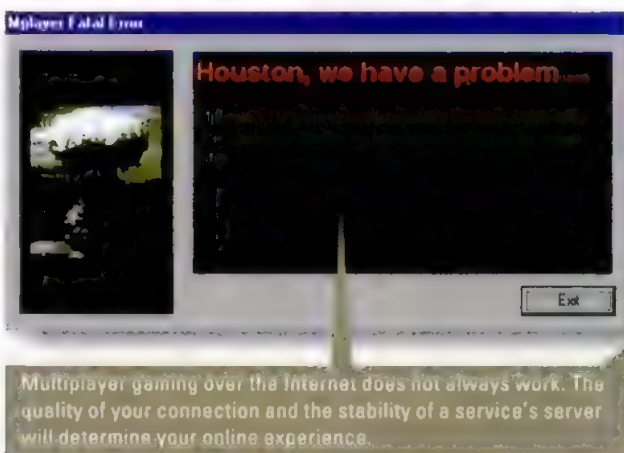
WHAT'S IMPORTANT?

There's just something about the *ka-thump* noise the rocket launcher makes in Duke Nukem 3D that gets us all worked up. We laugh like fiends when we assemble Bloodscurge in Hexen. And we love the smell of a BFG 9000 in the morning. And we are apparently not alone: Action games—specifically, the violent kind—are clearly the most popular type of online

three of the services rely on the not-so-reliable Internet, we felt this was of primary importance. Results were all over the map: Some services provided stellar performance, while others exhibited an alarming degree of lag and latency.

Next we looked at the typical user and the overall online community for each service. We also considered the quality and civility of each service's chat rooms. Unfortunately, not all the services were populated by mature users.

We also looked at the price-



ternet sites, such as www.rid-dler.com. But for this story, we focused on those services that let users dial in and play the most popular action and strategy games on the market—action and strategy currently being the two best-selling categories of gaming software. Command & Conquer, DOOM II, Duke Nukem 3D—that's what we were looking for.

With this mission in mind, we set off to evaluate the services we see as the four major contenders in the online gaming community.

Two of the services in this story, Mplayer and TEN, were not yet finished as we went to print. Instead, they were both conducting open beta testing, which is why we included them (open beta testing means that

game right now. This may be because of the overwhelming popularity of DOOM, or because they're simple and easy to learn (or maybe because we who like them are a little sicker than the rest of you). Whatever the reason, if you log on to any of these services, be prepared for computerized carnage.

The model for each service is simple: You log on, you mingle with other users in a big chat room, you find others willing to play the same game as you, and you try to beat them into submission.

We evaluated each service using a variety of criteria, beginning with wide availability and a selection of top-notch retail game titles. Then we looked at each service's performance and reliability. Since

ing for each service. This was a secondary consideration for Mplayer and TEN, as they had yet to settle on a fixed pricing model. But DWANGO has a pay-per-play pricing model in place, and we're sure that Mplayer and TEN will at least be competitive with that. Kali charges a one-time fee only, and we doubt that the other services will be able to beat it.

Last, we evaluated ease of setup and configuration. In almost every case this was very simple. Only Kali had a complex setup process, and that was only for its DOS client.

Using these reviews (and previews) as a guide, we hope you'll find an online gaming service that suits your needs and tastes. Just make sure you bring enough ammo.

DWANGO

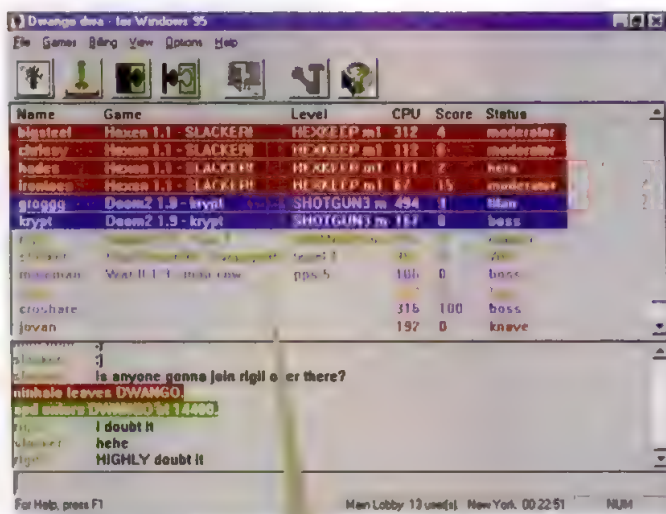
Of all the online gaming services in this review, DWANGO (short for Dial-up Wide Area Network Gaming Operation) offered the best, most reliable game performance. It was also the only service, other than Kali, that was commercially available and charging usage fees at the time of this review.

DWANGO is a BBS-style service available for both DOS and Windows 95. DWANGO charges \$7.95 per month (which includes unlimited time in the chat lobby and 5 hours of game time). Users can purchase additional time in 10-, 20-, and 40-hour increments, which cost \$19, \$34, and \$59, respectively.

Instead of using Internet links for connectivity, DWANGO relies on direct dial-up links, whereby users connect to the server nearest them. Currently, the service maintains 24 servers across the U.S. (and 3 abroad). Interactive Visual Systems Corp. (IVS) does not disclose DWANGO membership information, but we estimate the average number of users per server to fall between 25 and 50. The New York City, Houston, and Dallas servers are the most active.

The DWANGO servers are not interconnected, so when you set up an account on one, that is the only one you will be able to access. We see this as a needless restriction. Once a DWANGO user establishes an account, he or she should at least have the option of accessing more than one server.

DWANGO users typically log on to play one game:



The DWANGO 95 interface is well designed and intuitive, but most DWANGO users dial in from DOS.

DOOM II. Even though the game is a bit dated, it is still incredibly popular. All the other iterations of DOOM are also supported (DOOM, Ultimate DOOM, and so on), as are Heretic, Hexen, MechWarrior 2 (for DOS only), Strife, and Terminal Velocity. Duke Nukem 3D and Warcraft 2 were also available, apparently in conflict with these games' exclusive online availability elsewhere.

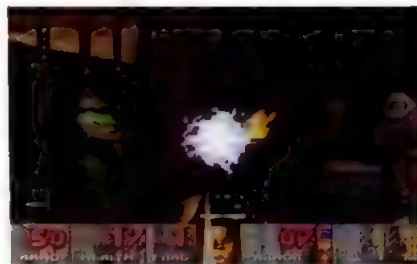
During our tests, we could only get DWANGO's Windows 95 client to work with Windows 95 versions of DOOM II and its cousins, not with DOS versions. According to IVS, Windows 95 clients should be able to play with DOS clients. The next version of the client (tentatively slated for a November release) will be Windows 95 only.

Both versions of the client software are available at the DWANGO web site (www.dwango.com) and are very easy to configure.

Once you log on to DWANGO, you enter a general chat room. These are like the mercenary guilds of the online gaming community. The players on DWANGO are *good*,

and—for the most part—they know it. This can be daunting for new players, as frequent lopsided drubbings can be frustrating. But at least you know you're in for a challenge when you dial DWANGO.

To start a game, you pick your favorite title (Hexen for



Amazing but true, DOOM II is far and away the most popular game on DWANGO.

us) and create a team. For some games, you must also configure an option or two (such as the character class in Hexen). Then other users can join your team—but they must select the same options you did, or the game will crash

after launching. In fairness to DWANGO, this is a fault of the games' multiplayer support, not the service. But even if everyone is in sync, games often fail to launch properly on the first couple of tries (for no apparent reason).

Once you attract other players and launch a game, a running tally of that game's scores is reported back to the lobby. We loved this feature. DWANGO also assigns users a status (ranging from Squire to Deity), based on the amount of time they've played on the service. We'd prefer a system like TEN's, however, that is based on a user's skill and performance.

DWANGO was the only service to have a full-fledged lobby moderator system in place to police the lobby and keep the language civil. Users who step out of line earn the status of Sewerslime and are temporarily suspended from the service.

For flat-out performance and the classic DOOM-style games, you can't beat DWANGO. Still, we feel the service needs to move forward if it is to fend off the Internet-based services.

DWANGO. List price: \$7.95 per month (in-

cluding unlimited lobby time and 5 hours game time); 10 additional hours, \$19; 20 additional hours, \$34; 40 additional hours, \$59. Interactive Visual Systems Corp., Houston, TX; 713-467-0405; www.dwango.com.

Our Contributors: RICK AYRE, MARY E. BEHR, JOHN BLAZEVIC, ROBERT DALY, JOHN R. DELANEY, BRUCE DEODAT, CRAIG ELLISON, ROB GRAYDON, DAVID R. LAMBERT, MELANIO LOPEZ, GLENN MENIN, ARIE MOLLER, WILLIAM PAGAN, AMARENDRA SINGH, DAN SMITH, DAVID STRAUSS, DENIS TOM, MARK VALENTINE, and MICHAEL E. RYAN, who was the associate editor in charge of this story.



It's not *really* portable if you need these.

At last, you can have ultra-fast access to all your mobile CD-ROM applications, with no limitations. EXP's CD Traveler 620 is the only truly portable CD-ROM, since it can use your notebook's battery for power*. No need to search for an electric outlet. And no need for pack after pack of external batteries, which can severely slow your crucial CD-ROM access time.

With its 6-speed technology and low power PCMCIA-card interface, CD Traveler provides the fastest portable CD-ROM access time available. Plus its versatile design lets you position CD Traveler on its side — perfect for mobile use in tight spaces.

You can even use it to take a CD-music or multimedia game break from all your hard work. And it's compatible with most notebooks, with



CD TRAVELER 620®
The only portable CD-ROM that
works without external power.

total plug & play ability, so you'll never need to interrupt your computer work.

All for a price that lets you get more out of your mobile CD-ROM. For less. And if your notebook doesn't have sound capability, no problem.

Our CD Traveler 620S version provides 16-bit stereo sound.

CD Traveler 620 is the latest — and greatest — innovation in EXP's proven line of portable CD-ROM solutions. So start enjoying more mobile CD-ROM productivity today, with CD Traveler 620.

* To power the CD Traveler 620, your notebook computer must provide 5V, 1 amp of power to the PC card slot (most notebooks will comply). See your notebook computer manual. If your notebook does not meet this standard, or if you wish to use external power, you may power CD Traveler 620 with batteries or A/C power (A/C adapter included).

EXP
EXP Computer, Inc.

Mobile computing. A different world.

For more information call 1-800-EXP-6922 Fax (714)453-1319
Visit our web site at www.expnet.com

Available at these Authorized Retailers: CompUSA, Computer City Superstores, Office Depot, Incredible Universe, Software Etc., Babbage's or through Mail Order at: Computer Discount Warehouse - (800)375-4249, Mobile Planet - (800)675-2648, Notebook Supply Warehouse - (800)566-6832, PCS Complete - (800)669-4727, Toshiba Accessories - (800)959-4100, USA Flex - (800)374-9906.

©1996 EXP COMPUTER, INC. ALL RIGHTS RESERVED.

Give them Back-UPS® Office™ this holiday and they'll thank you 120 times a month

Take the Multipath™ Quiz for a chance to win a \$2,000 Shopping Spree



The holiday season is a happy time, unless the overload of flashing lights or a starting furnace causes a power sag. Then your computer pays the price for holiday cheer. A recent study by IBM showed that the typical computer experiences power problems up to 120 times a month. In fact, corrupt power is the largest single cause of computer data loss and hardware damage.

Back-UPS Office provides reliable power for your entire system. Instantaneous battery backup ensures uninterrupted operation of your CPU, monitor and an external storage device. Full-time surge suppression and site-wiring fault protection spreads a true Multipath™ safety net under any remaining integrated peripherals, like modems, printers, fax machines and phone systems. Back-UPS Office also provides convenient BlockSafe™ outlet spacing to handle all size plugs – even large transformer blocks.

Unique Multipath protection keeps your PC and data safe

Plugging a phone line into your computer doubles your vulnerability to power problems; add any peripheral, and it triples. Even if your AC power-line is shielded, when a surge hits an unprotected peripheral, it can blaze down serial and data lines, and toast your expensive PC.

Back-UPS Office protects your entire system

Until now, protection for your entire system required several devices. But multi-device protection can leave you vulnerable to line noise and unwanted data glitches created by the voltage differential between outlets. Those glitches are prevented with the Back-UPS Office common voltage reference.

Back-UPS Office means true Multipath protection, clean, safe power to every peripheral, and instant battery backup to keep your cutting edge system and O/S from crashing. It means protection for less by integrating the security of a surge suppressor with the power of a 250 VA UPS, guaranteed up to \$25,000 (see policy for details).

CIRCLE 162 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BUYERLINK](http://www.pcmag.com/buyerlink)



"...for any PC today—especially if you run your business on it — [a UPS] is an indispensable peripheral." — PC MAGAZINE

APC has won more awards for reliability than all other UPS vendors combined.



even covered by up to \$25,000 in Lifetime surge protection insurance. No wonder the world's leading computer experts recommend APC.



design installs easily on desktop

APC Multipath Quiz Rules:

Follow the instructions on the reply card for a chance to win a shopping spree at a participating store (listed below).

Prizes:

First:	\$2,000
Second:	\$1,000
Third:	\$500

Complete the quiz at www.apc.com and be entered in a second drawing for a free t-shirt! All entries must be received by 12/31/96. Drawing to be held 1/2/15/96.

COMP USA

MICRO CENTER

Fry's

WIZ

WIN A \$2,000 SHOPPING SPREE!

Answer the quiz questions correctly (Hint: Answers are in the ad), fill out the information below completely and send to APC or enter from our PowerPage™ on the Web, for a chance to win a \$2,000 Shopping Spree. We'll send you a Free 60 page Power Protection Handbook just for trying.

- Multipath power protection means surge suppression on...
☐ Dataline ☐ Computer AC ☐ Peripheral AC ☐ All of the above
- APC will repair or replace any equipment properly attached to a Back-UPS Office up to...
☐ \$1,000 ☐ \$5,000 ☐ \$25,000
- If I plug my external modem into a surge suppressor and the dataline into the wall, my computer is safe from power problems. ☐ True ☐ False
- My transformer block plugs will fit Back-UPS Office without covering an extra outlet ☐ True ☐ False

Name: _____ Title: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____ Country: _____

Phone: _____ Fax: _____

E-Mail: _____

Is this your first contact with APC? ☐ Yes ☐ No I am an ☐ End user ☐ Reseller

of workstations on site/sold per month: _____ Brand of UPS currently used/sold: _____



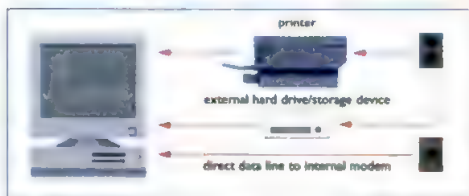
Over 6,000,000 satisfied customers insist "Protect ME! with APC".



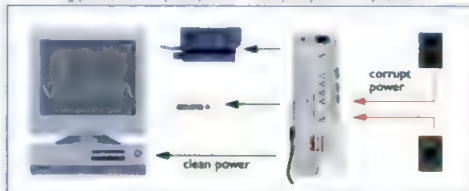
Steve Richbourg
Senior Power Quality Engineer
Gulf Power Company

"I just got my first Back-UPS Office. I've purchased seven since because people keep stopping by my desk and saying they want it! Recommending power protection is what I do for a living, and I've never had an upset customer in more than four years recommending APC."

Multipath™ Means Total Power Protection



bad power (red) can enter a computer system through multiple paths eg. printer, data and phone/fax lines - even if computer A/C is protected.



The Multipath™ protection of Back-UPS Office™ shields your peripherals and guards your computer from bad power on every path, providing clean, safe power (green), to your entire system.

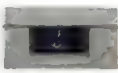
Back-UPS Office award-winning features:

Integrates the Security of a Surge Suppressor with the Power of a UPS

Six outlets guard your hardware with full-time surge protection. Three of the six outlets provide instantaneous battery backup to keep your system from crashing in the event of brownout or blackout.

Internet Ready Fax/ Modem Protection

Back-UPS Office's built-in phone line/10 Base-T network cable surge protection prevents surges from damaging internal & external modems, motherboards, 10 Base-T lines, input/output cards, and other system components.



Convenient BlockSafe™ Outlet Spacing

Back-UPS Office's outlets are spaced to accommodate all size plugs, including large transformer blocks.

Master On/Off Switch

One switch conveniently controls power to entire connected system.

Electrical Wiring Fault Indicator Saves Trouble and Expense

Without a proper ground, most surge protection is useless. Back-UPS Office alerts you to wiring problems such as a missing ground and reversed polarity, two common miswirings which otherwise would require an electrician's visit to diagnose.

Circuit Breaker

Provides protection in the event of an overload or short circuit; no fuse, no hassle.

Check Battery Warning Prevents Downtime Before it Occurs

An LED signals when Back-UPS Office's internal self test finds the battery near the end of its life, giving you 6-8 weeks warning.

\$25,000 Equipment Protection Policy

If your properly connected equipment is ever damaged by an AC surge, including surges due to lightning, APC will repair or replace our product and up to \$25,000 of connected equipment for as long as you own your Back-UPS Office. (See policy for details.)

User Replaceable Batteries

Back-UPS Office has user replaceable batteries that can be easily swapped out, saving time and expense; no need to return the UPS to the factory for service. Batteries last 3-6 years under normal usage.

2 Year Warranty

Unmatched reliability means you can purchase all APC products with confidence.

You can also register to win at the PowerPage™ on the World Wide Web at <http://www.apcc.com>

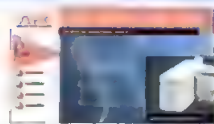
Place
Stamp
Here

APC
AMERICAN POWER CONVERSION

Dept. E4
132 Fairgrounds Road
P.O. Box 278
West Kingston, RI 02892-9920

CHOOSE THE RIGHT APC PROTECTION

• For advanced PC protection, including automatic voltage regulation, CellGuard battery management and phone line/10BaseT protection, choose the Back-UPS Pro. For longer runtime choose a higher VA rating.



BACK-UPS PRO ADVANCED PC PROTECTION:

For Pentium, 486, Win 95, and Business Applications

Volt-Amp Rating	List Price	Runtime*
280PNP	\$199	6 min.
420PNP	\$339	8 min.
650PNP	\$419	17 min.
1000 ^{PNP}	\$589	35 min.
1400 ^{PNP}	\$759	74 min.

• For Multipath™ PC and peripheral protection, choose new Back-UPS Office, featuring 6 outlets with guaranteed surge protection, 3 of which provide instantaneous battery backup, fax/modem protection, and BlockSafe™ outlet spacing for the accommodation of all size plugs and transformer blocks.



BACK-UPS OFFICE MULTIPATH™ PROTECTION:

For 386, Entertainment, education & all peripherals

Volt-Amp Rating	List Price	Runtime
250	\$179	10 min.

• For Basic PC protection, choose from the Back-UPS family (software not included).



BACK-UPS BASIC PC PROTECTION:

For 286, 386, Entertainment, and education

Volt-Amp Rating	List Price	Runtime*
200	\$119	-
280	\$139	7 min.
400	\$199	13 min.
450	\$254	24 min.
600	\$359	31 min.
900	\$529	47 min.
1250	\$689	75 min.

- For Fileserver protection, ask for our award-winning Smart-UPS® line (not shown).
- For Datacenter protection, ask about our Matrix-UPS line (not shown).
- For hardware-only surge protection, ask for APC's SurgeArrest™ line (not shown).

*Runtime shown is for typical Pentium desktop system and may vary with your actual load.

Note: Back-UPS 200 not recommended for Pentium systems

**Does not include FREE PowerChute Pro Power Management Software.

Fax: (401)788-2797 • PowerFax: (800)347-FAXX
CompuServe: GO APCSUPPORT • Email: apcinfo@apcc.com
(+353)91 702000 Ireland • (+33)05.39.32.03 France
(+49)89 958 235 Germany • (+44)753 511022 UK
(+44)753 511022 Middle East/Africa • (+39)2 29 40 55 08 Italy
(401)789-5735 Latin America • (+1)525 679 9586 Mexico
(+7)09 53 66 21 56 Russia • (+83)5295 1988 Japan
(+33)1)64.62.59.00 Europe • (81)3)5295-1988 Asia/Pacific
(401)789-5735 Worldwide
132 Fairgrounds Rd., West Kingston, RI 02892 • (NASDAQ:APCC)

APC
AMERICAN POWER CONVERSION

1-888-BUY-APCC ext. 8013
<http://www.apcc.com>

© 1996 American Power Conversion. All Rights Reserved. All trademarks are property of their owners. Specifications subject to change without notice. AB0011

Absolute 3D graphics. You want them to scream.

You want them to be real. You want them to be S3d.[™]

The What: The S3d acceleration chip makes games,

Internet 3D, and all Windows applications dance. It lives on

something to scream about.

accelerator boards and computer systems carrying

the S3d logo. It revs all 3D and 2D games and software,

but when you match S3d logo hardware with S3d logo

software, the results are extreme: the best 2D graphics,

the most realistic 3D, and an affordable price.

The Where: Seek S3d on computer systems like

Compaq, Dell, Hewlett Packard, and Packard Bell.

Find S3d on accelerator boards from Diamond Multimedia,

Number Nine, and STB. Demand S3d on games from

Interplay, Activision, Eidos, Mindscape and on titles like

Descent II,[™] MechWarrior 2,[™] Confirmed Kill,[™] and MegaRace 2.[™]

The Why: Because you want 3D so real it screams.

hit our web site for the real stuff: seek.s3.com

S3d is compatible with Windows 95, Windows 3.1, Windows NT,[™] and OS/2.

©CIRCLE 289 ON READER SERVICE CARD



The Local Multiplayer Connection

By Michael E. Ryan

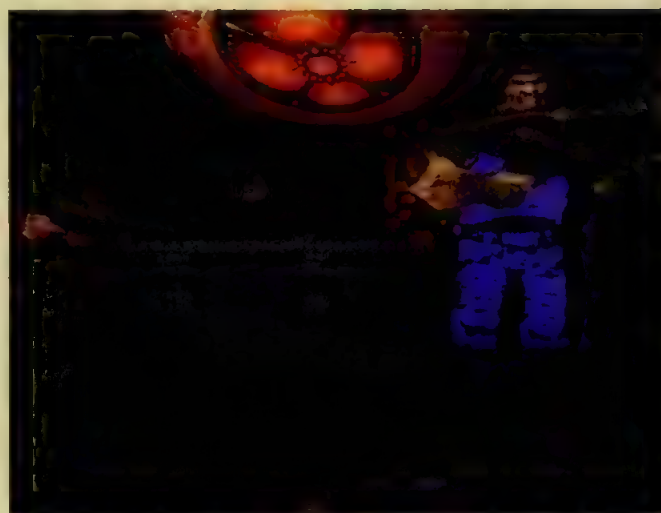
Are you one of those oh-so-fortunate souls who actually have access to a high-speed, Ethernet network for multiplayer gaming? If so, you already know the joy of multiplayer gaming at its peak performance level—no lag, no latency, just frags and lots of them.

We realize the reputation multiplayer games have in the network management community—we've seen our share of eliminate DOOM.EXE utilities—so we thought it was high time someone examined the actual effects a multiplayer game has on an Ethernet LAN. If you're a network administrator, you may want to cover your eyes: You won't like what we have to say.

We set up a self-contained Ethernet network using four Gateway 2000 Pentium/120s and an Asanté 12-port hub. Each Gateway was equipped with 16MB of RAM, an 8X CD-ROM drive, a Sound Blaster AWE32 PnP sound card, an STB Light-speed 128 graphics card, and a 3Com EtherLink III Model 3C509 Ethernet adapter.

We used Windows 95's built-in networking to link the PCs and proceeded to install 11 hot multiplayer games, including some of the most popular titles on the market. With four active players in each game, we used Novell's LANalyzer network analysis software to measure the following.

- **Network utilization:** The percentage of the total network taken up by a game's traffic.
- **Packets per second:** The number of data packets transmitted in a second by all four PCs on the network.
- **Packet size:** The size of each packet. In most cases this was a fixed size, but Quake's packets varied slightly in size, so for that game we reported an average.
- **Kilobytes per second:** The rate of data transmission on the network.



Not only is Quake a well-behaved network citizen, but it's a lot of fun, too (although the blue player might disagree).

Most of the titles used IPX for network play, but we also included a trio of Windows 95 DirectPlay titles, to see if Microsoft's multiplayer API offers any advantages. We also had one client/server game in the mix (Quake) as well as two versions of a single game (Warcraft II), simply because that game's network performance was improved so dramatically between Versions 1.0 and 1.2.

As you can see from the table, the worst network citizen we could find—the most grievous consumer of network bandwidth—claimed a whopping 9 percent of the overall network at its worst. This was Warcraft II, Version 1.0. In Version 1.2, the same game was much better behaved, taking a scant 3 percent at its worst.

Lower scores represent better performance								
Game	Protocol used	Average network utilization (percent)	Peak network utilization (percent)	Average network load (packets per second)	Peak load (packets per second)	Packet size (bytes)	Average load (kilobytes per second)	Peak load (kilobytes per second)
Command & Conquer 1.18	IPX	: 2	: 4	: 408	: 736	: 50	: 24	: 51
Descent II 1.0	IPX	: 1	: 1	: 98	: 114	: 121	: 14	: 16
DOOM II 1.9	IPX	: 2	: 3	: 425	: 469	: 62	: 34	: 37
Duke Nukem 3D 1.3	IPX	: 1	: 2	: 350	: 371	: 45	: 21	: 25
Final DOOM for Windows 95	Winsock IPX over DirectPlay	: 2	: 3	: 425	: 471	: 58	: 32	: 36
Hellbender (prerelease version)	Winsock IPX over DirectPlay	: 1	: 1	: 90	: 133	: 98	: 10	: 14
Hexen 1.1	IPX	: 2	: 3	: 421	: 454	: 66	: 34	: 38
MechWarrior 2: Pentium Edition	Winsock IPX over DirectPlay	: 1	: 1	: 83	: 103	: 101	: 12	: 15
Quake 1.01	IPX	: 1	: 1	: 93	: 127	: 58 (client), 138 (server)	: 10	: 17
Terminal Velocity 1.2 (shareware version)	IPX	: 1	: 1	: 105	: 158	: 104	: 12	: 18
Warcraft II: The Tides of Darkness 1.0	IPX	: 8	: 9	: 381	: 460	: 242	: 98	: 118
Warcraft II: The Tides of Darkness 1.2	IPX	: 2	: 3	: 465	: 546	: 42	: 28	: 34

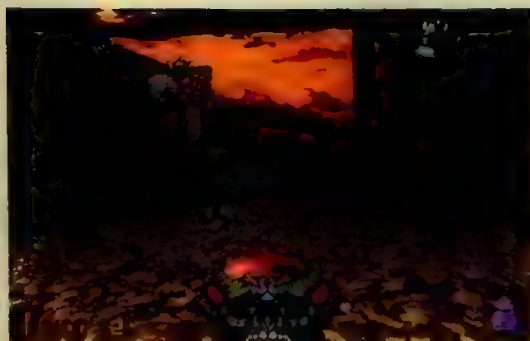
The rest of the field was remarkably well behaved throughout our testing. The biggest surprise of all was Quake (registered Version 1.01), which proved to be a rather network-friendly application. The Quake server does generate considerably more traffic than the clients, but the game's overall network requirements were very low.

We were also surprised to see that both Descent II and Quake were generally more efficient than all three of the DirectPlay games.

In general, we feel that the numbers we gathered indicate that multiplayer games may have a bum rap, probably brought on by the early horror stories of a very inefficient network mode in the original DOOM. But of the games we tested here, not one should cause significant problems to a well-designed Ethernet LAN. Even with other network tasks running on the wire, most of these games would move along just fine and mind their own business. Unless you have a Sniffer handy, you probably wouldn't even know they were running.

THE HUMAN FACTOR

Or maybe it's just that multiplayer games are anathema because of their effect on productivity? We can certainly see the logic in that argument. These games have a tendency to drag you in and



For us, there are few better things in life than having Bloodscurge and an Icon of the Defender in Hexen.

keep you there until your eyes ache and your hands cramp.

On the other hand, multiplayer games on the LAN every once in a while—say, after 5:00 once a week—can be a wonderfully therapeutic experience. What better way to vent one's stress than to pour a steady stream of nails into coworkers with Quake's Perforator? Just think how satisfying it would be to build a Command & Conquer army of supertanks and Orcas to unleash on your boss (come to

think of it, that might be a bad idea).

If you do decide to load these games up on your LAN, we can only offer this advice: In Duke Nukem 3D, stock up on atomic health and get the rocket launcher and jet pack before setting out. In Hexen, find all the Icons of the Defender and Mystic Urns you can, then build yourself a super-powerful artifact like Wraithverge. In Quake, the Quad-Damage and the Thunderbolt go nicely together. And in Warcraft II, be sure to use more than one peasant to build structures, to speed up the work.

Most importantly, if your keyboard has Windows keys, don't touch them during a network game, as that tends to freeze every player's machine. Oh, and make sure you ask your network administrator before doing any of this, okay?

GameLAN

Although we used a standard Ethernet network to gather the data for our table, we also tested each of the games listed on a handy little network called GameLAN, from Apexx Technology. This convenient, easy-to-set-up system uses small, parallel-port adapters and basic phone cable to connect 2 to 12 PCs running DOS, Windows for Workgroups, or Windows 95. GameLAN is available as a starter kit that includes two adapters, a 25-foot phone wire, and the GameLAN software. The add-on kit is identical except that it has only one adapter.

Using the same four Gateway 2000 PCs mentioned above, we set up our GameLAN network in about 10 min-

utes. The process was simple and thoroughly documented. We plugged an adapter into the back of each PC, connected the cables between the adapters, plugged terminators into the adapters at either end of our network, and installed the software. Each adapter used the PC's keyboard port for power. (Apexx includes a pass-through connector, and an optional external power supply is available.) In addition to network drivers, GameLAN ships with shareware versions of Advanced Tactical Fighters, DOOM, Duke Nukem 3D, Heretic, Hexen, Terminal Velocity, and Warcraft II.

After that, we had four PCs connected via Microsoft File and Printer Sharing under Windows 95. We also booted each PC straight to DOS 6.22 and tried GameLAN's IPX support, which

worked flawlessly.

Although GameLAN does not operate at Ethernet or even Token-Ring speeds (it runs at a meager 1.2 megabits per second), the network's performance was more than adequate for all of the games on our list except Warcraft II, Version 1.0, which was a dog on the Ethernet network as well.

The benefit over regular, similarly priced Ethernet cards, you ask? The answer is simplicity. The GameLAN adapters lend credence to the term *plug-and-play*—and that's not a term we take lightly.

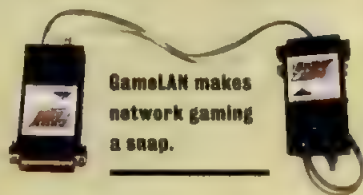
So if you have a couple of PCs you want to link for gaming and you don't want to spend a lot of time or money, be sure to check out GameLAN.

—MER

GameLAN Starter Kit. List price: \$139.99.

GameLAN Add-On Kit. List price: \$69.99.

Apexx Technology Inc., Boise, ID; 800-767-4858; www.apexxtech.com.



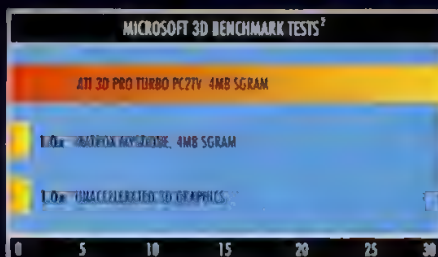
New ATI 3D graphics upgrades put A WHOLE NEW SPIN

on the way you view your computer and watch TV.

Everywhere you look, eyes are popping and heads are spinning over the new ATI 3D PRO TURBO™ PC2TV and 3D XPRESSION™ PC2TV graphics

	ATI 3D XPRESSION™ PC2TV	MATROX MYSTIQUE	DIAMOND STEALTH 3D 2000XL	ATI 3D PRO TURBO™ PC2TV	MATROX MYSTIQUE
Output to TV	•			•	
1600 x 1200 (16:10)	•			•	
3D Texturing (Bibiaca)	•		•	•	
Smooth Video	•	•		•	
Performance (WinMark)	40.7M	35.9M	33.6M	41.5M	37.7M
Price	\$219 (2MB)	\$219	\$199	\$349 (4MB)	\$449

upgrades. The only ones with the new PC2TV feature that uses your

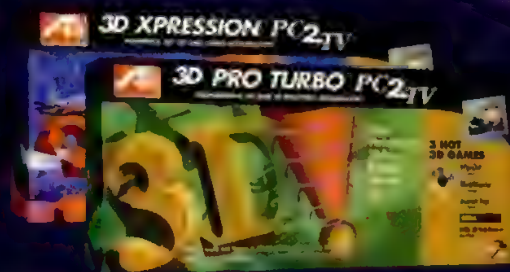


COMPARISON	3D XPRESSION™ PC2TV	3D PRO TURBO™ PC2TV
Use	Games, Home, Business	Power Users, Engineers, Graphics Professionals
Maximum 3D Resolution and Colors*	1024 x 768 @ 7.5s	1600 x 1200 @ 7.5s
Maximum Resolution	1600 x 1200 @ 60Hz	1600 x 1200 @ 75Hz
Memory	2MB or 4MB (2MB upgradable to 4MB)	4MB Upgradable to 6MB or 8MB

television set for big screen business presentations and awesome in-your-face game playing. The first ones that make it plug and play simple to get the best possible combination of 3D, 2D and full-screen video performance. With more high-end 3D features built right onto the board

than you get from Matrox, Diamond or anyone else. With 16.7 million colors at 1280x1024 resolution, and the smoothest TV quality video playback you can get. Which means startling improvements in realism and response from multimedia games, business apps and Web graphics. And both come with the ATI 3D

Software Superpack that includes three of today's hottest 3D games absolutely free. Move up to the superior performance and resolution of ATI 3D upgrades. There's no better value around. See them now at your dealer or visit us at www.atitech.co.





Also in systems from IBM,
NEC, Sony, Acer, Gateway



NOW YOU SEE IT.™



© ATI Technologies Inc., 1996; ATI, 3D PRO TURBO, 3D XPRESSION and PC2TV are trademarks and/or registered trademarks of ATI Technologies Inc. All other company and/or product names are trademarks and/or registered trademarks of their respective manufacturers. 1. All performance tests conducted by ATI on a P5-200MHz system with 32MB EDO RAM, 256K cache. The 3D XPRESSION PC2TV, Matrox Mystique and Diamond Stealth 3D 2000 are configured with 2MB of memory and the 3D PRO TURBO PC2TV and Matrox Millennium with 4MB of memory, the PCI bus using driver releases 3.0, 1.0, 4.0, 3.0 and 2.2 respectively. WinBench tests conducted at 1024x768 resolution at 256 colors at 75Hz refresh under Windows 95. 2. Test conducted on a P5-75MHz system with Microsoft Tunnel Test in 640x480 resolution at 65K colors in bilinear. 3. Bilinear texturing not supported in hardware. 4. Double buffered with 16-bit Z-buffer.

CIRCLE 058 ON READER SERVICE CARD OR GO TO [HTTP://WWW.PCMAG.COM/BuyerLink](http://www.pcmag.com/BuyerLink)



SUBSCRIPTION SALE

Regular
Subscription
Price

~~\$14.97~~

Annual
Newsstand
Price

~~\$86.90~~

Special
One-Year
Price

CALL NOW
FOR BIG
SAVINGS

Answers. Advice. Strategies. Solutions.
22 times a year, you get it all
from PC MAGAZINE.

To reserve big savings,
call toll-free:

1-800-289-0429

BONUS:

**Free CD-ROM with your
paid subscription!**

AT HOME

Multiplayer Gaming

Mpath Interactive

Mplayer

Can the Web be a viable avenue for multiplayer action games? The folks at Mpath sure think so, and after playing with Mplayer for a few weeks, we're inclined to agree.

Mplayer is an Internet-based service currently available for Windows 95 only. At the time of this review, pricing was tentatively set at \$9.95 per month plus \$1.95 per hour. Supported games include Command & Conquer, MechWarrior 2 (for Windows 95 only), Terminal Velocity, and Warcraft. Upcoming titles include Deadlock, SimCity 2000, and—the big one—Quake.

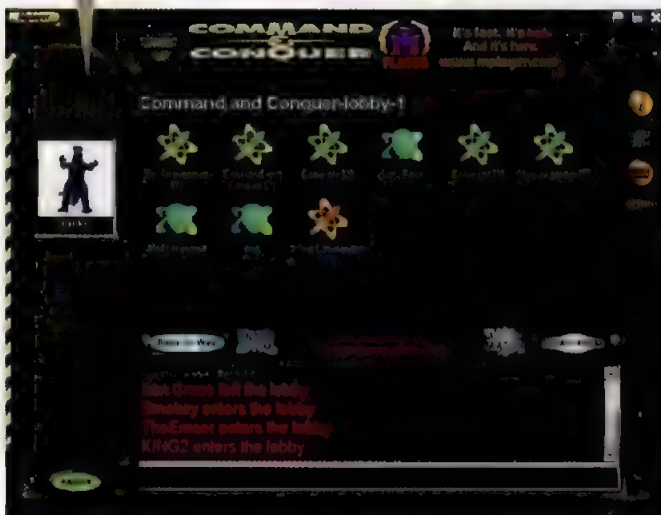
Client software for Mplayer is available on Mpath's Web

site (www.mpath.com) via a link to Happy Puppy, the popular Internet gaming site. Alternatively, you can request the software on a free CD-ROM from Mpath.

Setting up the Mplayer client is not difficult, but it could be a lot more intuitive and less time-consuming. If you want to play Command & Conquer or MechWarrior 2 on Mplayer, you should make sure you have installed the full, commercial version of that game on your system. Then, when you install the Mplayer client, you can "Mplayer-enable" these games to work over the online service. Mplayer-enabled versions of Terminal Velocity and Warcraft are included on the Mplayer CD-ROM. Over time, as you continue to log on

to Mplayer, the service will notify you of available upgrades, which can be downloaded and implemented automatically.

To play games on Mplayer, you first connect to the Mpath Web site using your Web browser and an ISP connection. From here you can



30-bit Color Scanning For Unreal Images At An Unbelievable Price.

Introducing Microtek's Incredibly Fast 30-bit, Single-Pass Color Flatbed Scanner — Starting At Just \$599!

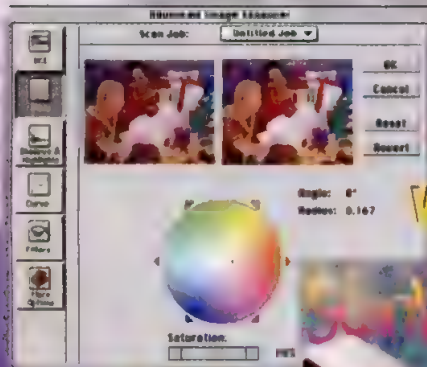
Producing digital art for printing? Developing a multimedia presentation? Need images for your web page? Microtek's new 30-bit *ScanMaker® E6* color flatbed scanner captures images with amazing highlight and shadow detail in stunning lifelike color. The *ScanMaker E6* at \$599 includes Microtek's award-winning *ScanWizard™* scanning software to descreen, tint, sharpen, blur, darken, lighten, saturate, desaturate, emboss or add other special effects to images right before your eyes — *even before you scan them!*

At this low price, the *ScanMaker E6* also includes *Caere's OmniPage Limited Edition®* for scanning pages of text, *U-Lead's PhotoImpact 3.0* (full version) and *ImagePals Go* for Windows; or *MicroFrontier's Color It!* for Macintosh.

Or ask about the *ScanMaker® E6 Pro™* for Windows at just \$799 which also includes Microtek's *ScanWizard* scanning software and *Caere's OmniPage Limited Edition* as well as the full-version of *Adobe Photoshop*. The *ScanMaker E6 Pro* for Macintosh includes the full-version of *Adobe Photoshop* and the full-version of *Live Picture 2.1* for Macintosh for just \$899.

Also consider Microtek's new *ScanMaker® E3* which starts at just \$399 and features 2400 dpi maximum resolution, *ScanWizard*, *Caere's OmniPage Limited Edition* for Windows or Macintosh and either *U-Lead's PhotoImpact 3.0 SE* and *ImagePals Go* for Windows or *MicroFrontier's Color It!* for Macintosh.

For the location of your nearest Microtek reseller or for more information, call 1-800-654-4160, use our convenient Auto Tech fax-back line at (310) 297-5101, or check out our Web site at <http://www.mtclab.com>



MacWEEK (August 7, 1995)

Works with
Windows 95! & NT!

MICROTEK ScanMaker E6

- 30-bit color depth
- Incredibly fast single-pass speed
- 600 x 1200 optical resolution
- 4800 dpi maximum resolution
- Includes *ScanWizard™*, OCR and image-editing software for Windows or Macintosh



Starting at
just \$599!

MICROTEK

Better Images Through Innovation.

Prices mentioned are United States of America suggested street prices. The following are trademarks or registered trademarks of their respective companies: Microtek, ScanMaker, ScanWizard, OmniPage, PhotoImpact, ImagePals, Color It!, Live Picture, and Auto Tech. Microsoft, Windows, and Macintosh are trademarks of Microsoft Corporation. Apple Computer, Inc. Adobe Photoshop of Adobe Systems, Inc.; PhotoImpact and ImagePals Go of U-Lead Systems, Inc.; Color It! of MicroFrontier, Inc.; OmniPage Limited Edition of Caere Corporation; Live Picture of Live Picture, Inc. All other trademarks or registered trademarks are the property of their respective holders. Prices, specifications and software bundles are subject to change without notice. E6E302WM

CIRCLE 091 ON READER SERVICE CARD

THE EASIEST WAY TO CREATE MULTIMEDIA—YOU CAN DO IT!

COREL®

CLICK & CREATE™

EASY & POWERFUL
MULTIMEDIA AUTHORIZING



COMPETITIVE
UPGRADE
\$233.87*
FULL CD-ROM
VERSION
\$441.94*

Ideal for Creating:

- Multimedia applications and games
- Corporate presentations
- Interactive training guides
- Kiosks
- Digital publications
- Screen savers

Incredible Value!

- 200+ fonts
- 1,100+ clipart images
- 250+ video clips and animation files
- 1,400+ sound files
- 100+ graphics-packed libraries including complex 3D images
- 100+ pre-made transition effects
- 150+ backgrounds

MORE AMAZING COREL PRODUCTS FOR YOUR MULTIMEDIA PRESENTATIONS



\$37.63*

Corel® Stock Music Library

Over 100 royalty-free
stock music clips



\$56.29*

Corel GALLERY™ 1

15,000 high-quality
CD-ROM clipart images...
and more!



\$884.76*
each

Corel® Stock Photo Library 1, 2 & 3

30,000 photos on 200
CD-ROMs in each library



\$37.50*
each

Corel® Super Tee Photo Packs

1,000 photos on 10
CD-ROMs in each pack

High-resolution, royalty-free photos on CD-ROM
(also available in individual titles)

Corel® Click & Create™ puts you on the cutting edge of 16- and 32-bit multimedia authoring. Explore your creativity as you visualize and develop your own CD-ROM games, multimedia titles, corporate presentations, training and educational materials, screen savers and more... with the ease of drag-and-drop functionality. Powerful tools and comprehensive libraries offer amazing flexibility, allowing you to combine text, graphics, video, animation and audio into an endless array of professional-looking projects. Instead of learning a complicated scripting language, drag and drop objects to the playfield and then assign and control objects' behavior with simple mouse clicks. Corel® Click & Create™ is your easy and powerful multimedia authoring tool!



For Windows® 95, Windows NT™ and Windows® 3.1x

ATTENTION DEVELOPERS!

For information on the
Created with Corel® Click & Create™
Developers Program, please call:
1-613-728-0826 ext. 85241



**COMPUTER DISCOUNT
WAREHOUSE™**
1-800-279-4CDW

*MSRP plus applicable taxes and shipping.



<http://www.corel.com>
Call now for latest literature!
1-613-728-0626 ext. 3000
Document # 1017

Free Net Gaming?

With the exception of Kali, each of the online gaming services in this story uses a pay-as-you-go pricing model to charge users. But a number of software developers have plans in the works that could very well threaten that model and each of these services. In fact, by the time you read this, we expect to see a number of games and services that let users connect and play over the Internet for free.

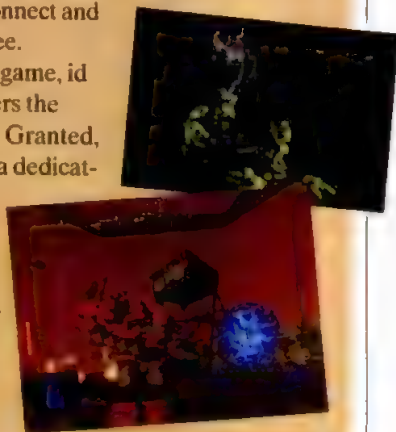
We've already seen one game, id Software's Quake, that offers the ability to play over TCP/IP. Granted, the ideal game will include a dedicated Quake server and a bucketful of ISDN connections to it, but the capability is there. Also, the Windows 95 versions of DOOM II and Final DOOM offer a DirectPlay TCP/IP option. And more games are set to follow.

Activision will follow up the megahit MechWarrior 2 with MechWarrior 2: Mercenaries. This prequel will offer great graphics and lots of cool new features—including a free Internet play option. Going several steps further than most, Blizzard (developer of the Warcraft series) will launch battle.net, a full-fledged, 24-hour, free Internet gaming service for its upcoming Diablo and Starcraft games. In each of the above instances, all the user needs is a copy of the game and an Internet connection.

Even Microsoft has plans in this arena. Although nothing definite had been announced as we went to print, we expect to see a free DirectPlay server package available from the folks in Redmond later this year (similar to the free Web server package released last year). With this sort of software, you could host DirectPlay games out of your home—without subscribing to an online gaming service.

Finally, MAK Technologies is busy drumming up support for a robust, 3-D networking standard called Distributed Interactive Simulation (DIS). DIS was originally developed for the military and is used in high-end combat training simulators, but it can easily be adapted for computer games over the Internet, according to MAK. Once a development kit is in place, game designers can start writing and hosting their own DIS at minimal cost.

Representatives of the online gaming services downplay the threat of free Internet gaming, arguing that few users will accept the slower, less reliable game performance over "generic" TCP/IP links. They may be right. But they may also underestimate the power of the word *free*.—MER



Diablo and MechWarrior 2: Mercenaries will both offer free Internet play.

Only Fujifilm prints photographs at this convenient location.



Introducing the only color printer that gives you actual photographs from your PC.

For years, we've made taking pictures simple. Now we've made it just as easy to print them. The new **Fujifilm Print-It** produces high-quality 3.5" x 5" photographs directly from a computer, TV, VCR or camcorder. Its thermo-autochrome technology means no inks, ribbons, toners or chemicals. While postcard-size prints mean plenty of fun. It's smart. It's simple. It's just what you'd expect from a leader in the photographic industry. For more information, call 1-800-378-3854.

Or for Fujifilm on CompuServe®

—> GO FUJI.

FUJIFILM

A new way of seeing things.

©1996 FUJI PHOTO FILM U.S.A., INC.

CIRCLE 294 ON READER SERVICE CARD

Introducing...

COREL SUPER TEN SERIES

Each pack includes ten great titles at one low price!

From Corel, the world leader in Windows® graphics software.

The Corel® Super Ten Series—bringing you the hottest titles from our best-selling multimedia lines: Corel® CD HOME and Corel® Professional Photos on CD-ROM.

COREL SUPER TEN

KIDS ENTERTAINMENT PACK

Inside the Corel® Super Ten Kids Entertainment Pack there's a whole cast of wacky cartoon characters and fascinating facts just waiting to be discovered. Keeping your child entertained and enlightened has never been easier—or more fun! For kids ages 3 to 14.



COREL SUPER TEN

ENTERTAINMENT AND REFERENCE PACK



There's something for everyone in the Corel® Super Ten Entertainment and Reference Pack. So whether you want to check out a movie, browse the classics or surf the Net, this super-value pack adds up to an unbeatable home entertainment and reference resource.

ALSO SOLD SEPARATELY:
INDIVIDUAL COREL® CD HOME TITLES
\$19.98*

COREL

SUPER TEN

ROYALTY-FREE HIGH-RESOLUTION PHOTO PACKS

Each Corel® Super Ten Photo Pack contains 1,000 colorful and captivating images on 10 CD-ROMs—all in one unique package.



Ideal for all your visual communication needs, these razor-sharp images in the Kodak Photo CD format, for both Macintosh® and Windows®, are also great as screen savers!

One thousand photos included in each Super Ten Pack!



ALSO SOLD SEPARATELY:
INDIVIDUAL PHOTO CD TITLES
\$18.98*



Corel, Official World Title Sponsor of the COREL WTA TOUR



Official Worldwide Sponsor of Baseball



CIRCLE 322 ON READER SERVICE CARD

*US\$ plus applicable taxes



http://www.corel.com
Call now for faxed literature!
1-613-728-0826 ext. 3080
Document # 1040

Corel is a registered trademark of Corel Corporation. Air Mover is a trademark of Matrix Software Inc. Bernard of Hollywood is a trademark of Renaissance Roads Productions, Inc. and is used under license from Twentieth Century Fox. Green Bear, Red Rhino and Yellow Hippo are trademarks of Alan Rogers. Houston is a registered trademark of Amiga, Inc. and is used under license from Amiga, Inc. Microsoft, Windows and Windows 95 are registered trademarks of Microsoft Corporation. Macintosh is a registered trademark of Apple Computer, Inc. All product and company names are trademarks or registered trademarks of their respective companies.

Stealth 3D. Speed into the next dimension.

Outrageously fast 2D graphics—plus 3D.

Prepare to push your PC into the next dimension with the Stealth 3D family from Diamond. The first in a superior line of affordable Plug and Play 3D accelerators with outrageously fast 2D graphics, vivid 3D animation and striking MPEG video playback—from the market leader in high-performance graphics subsystems. The Stealth 3D 2000 and 3000 dramatically improve graphic-intensive business applications, action games and overall system performance through greater resolution, millions of colors and extreme speeds. With optimum 64-bit graphics acceleration, lightning-fast response rates, 53's VIRGE chip family, Diamond's optimized drivers and a version of InControl Tools 95—you'll gain a whole new perspective on speed. The Stealth 3D family accelerates Windows 95, Windows NT 3.51 and 4.0, Windows 3.1x and DOS

operating systems and is compatible with 3D applications for Windows 95 using Microsoft's DirectX APIs. The Stealth 3D 2000XL* uses new Silicon Magic RAM technology and comes bundled with Interplay's Descent™ II*, Compton's Interactive Encyclopedia™ 1996 and Sony's Destruction Derby™. The Stealth 3D 3000, with support of up to 8MB VRAM, delivers enhanced resolutions and colors, OpenGL and AutoCAD support and higher refresh rates. The Stealth 3D 3000XL* comes bundled with Interplay's Descent™ II; Compton's Interactive Encyclopedia™ 1996; Asymetrix's 3D F/X™, Digital Video Producer™ and Microsoft's Internet Explorer. So, if you're ready to speed in three dimensions, contact Diamond at <http://www.diamondmm.com> and get everything you need to launch into the future of 3D graphics acceleration today.



Look for these logos on a new class of applications designed to take advantage of Stealth 3D graphics.

For more information,
contact Diamond at
<http://www.diamondmm.com>

WinBench' 96 Comparison in 24-bit Color Mode		3D Hardware Features Comparison		Stealth 3D 2000/3000 Comparison		
DIAMOND Stealth 3D 2000 MATRIX MGA Millennium™ 	***Measured in WinMarks 32.0 29.5		Stealth 3D Family Gouraud Shading Perspective Correction Alpha Blending Mip Mapping Bilinear Filtering Z-Buffering	MATROX MGA Millennium ◆ ◆ ◆ ◆ ◆ ◆	Stealth 3D 2000XL Memory RAMDAC Max Memory Max Resolution Bundled Software*	Stealth 3D 3000XL VRAM 135 MHz 4MB 1600 x 1200 • Descent II • Compton's Interactive Encyclopedia 1996 • Destruction Derby

24-Hour Fax-On-Demand: 1-800-380-0030 ♦ 1-800-4-MULTIMEDIA

© 2000 by the American Psychological Association, 0893-3200/00/\$12.00 DOI: 10.1037/0893-3200.14.4.442

CIRCLE 189 ON READER SERVICE CARD

choose one of the supported games, which takes you out of your Web browser and into that game's chat lobby. Though it may not sound too complicated, this launch process can last several *minutes*—it needs to be streamlined in a big way. We hope the recent merger between Mpath and Catapult Entertainment, developers of the slick Xband PC online gaming service, will lead to a smoother, more intuitive client. One positive step would be to eliminate the Web browser from the process, as on Xband PC.

From a game's chat screen, you can create rooms for other players to enter (rooms are Mplayer's equivalent of DWANGO's teams). To initiate a four-player Command & Conquer match, for example, you create a room that two to four players (including yourself) can enter. Once players enter your room, you can launch the game. We



liked the ability to set a flexible number of users. At the time of this review, Mplayer and TEN were the only services that allowed users to launch a game without waiting for a specific number of users to join.

Like TEN, Mplayer had no moderator model in place during our tests, though we're told

one may be in the works. It may not be necessary, as Mplayer had the friendliest atmosphere of the four services and the chats were generally very cordial.

The chat screen is nicely customizable and includes some cool features, such as a pager for private messages and a voice messaging option that lets you speak to other players using a standard microphone plugged into your sound card. This voice feature is also available in most of Mplayer's games.

Once Quake goes up on Mplayer, the service could draw the same sort of captive audience TEN has with Duke Nukem 3D. During our tests, however, we often had trouble finding anyone to play. In fact, we rarely found more than a handful of other players online at any time during the week. Weekends saw the most activity on Mplayer.

Once we found someone with whom to play, we were impressed with Mplayer's performance. Both Command & Conquer and MechWarrior 2 ran smoothly. We saw occasional pauses in both games, but nothing as infuriating as

what we saw on TEN. MechWarrior 2 displayed some "warping" (other players seem to move in short, quick bursts as the network updates their positions), but again, it was never enough to frustrate or annoy. In relative terms, Mplayer's performance was better than what we experienced on Kali and TEN but not quite up to the direct-dial quality DWANGO offers.

With good performance, decent pricing, popular gaming titles, and a community atmosphere, we think Mplayer will be a major contender in the online gaming arena. Adding a smoother client interface and more users could make Mplayer the one to watch.

Mplayer. List price: \$9.95 per month plus \$1.95 per hour. Mpath Interactive, Cupertino, CA; 404-342-8800; www.mpath.com.

Total Entertainment Network

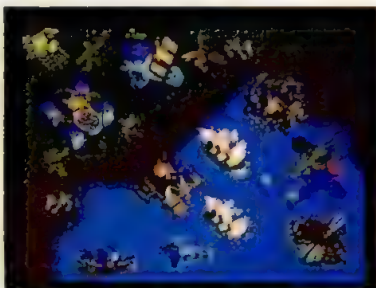
Total Entertainment Network

If you're a hard-core computer gaming fan, you've probably heard about TEN by now. Thanks to extensive media coverage, brochures and drink coasters (well, that's what they look like) stuffed into retail game packages, and a free, open beta test that garnered over 20,000 users, TEN quickly became one of the best-known online gaming services. But is it the *best*? Not quite. Although the service is slick, TEN must overcome serious performance problems before it launches this fall.

Like Mplayer, TEN is an Internet-based service currently available for Windows 95 only. Although rates are not yet final, TEN will cost ap-

In the On-Deck Circle...

Even as Mpath and TEN put the finishing touches on their respective online gaming services, yet another heavy hitter looms. Engage Games Online, an autonomous spin-off from Interplay Productions, should debut the Engage gaming network over America Online and Prodigy by the time you read this. Direct Internet access to Engage should follow later this fall.



Engage has exclusive rights to host Warcraft II online.

So how will Engage fare against the other services? Since we don't know what the service will look like, we can judge it only by the games it will offer. Knowing that Engage has exclusive rights to offer Descent II, Fighter Duel, Shattered Steel, and Warcraft II, we feel that the service has the potential to draw a lot of users. For more information about Engage, be sure to check out the service's Web site.—MER

Engage. List price: Not yet announced. Engage Games Online, Irvine, CA; 714-553-6655; www.gamesonline.com.

Hot new products for Internet graphics and publishing!

COREL WEB.DATA

Powerful Database Publishing for the Internet!

- ⇒ Publish data directly to the Internet
- ⇒ Create up-to-date online stock reports, catalogs, phone lists and much more
- ⇒ Format and publish information quickly and easily
- ⇒ No HTML knowledge required

"The program is amazingly effective...It's easy to learn, it's powerful, and it's inexpensive..."

C-NET, Pauline Ores, April 9, 1996

For Windows[®] 95 and Windows NT

\$96⁰⁰*



COREL WEB.GALLERY

Over 7,500 Internet-Ready Clipart Images!

- ⇒ Over 7,500 Internet-ready clipart images in GIF or JPEG formats
- ⇒ Visual file manager makes it easy to preview, organize and access all your images
- ⇒ Full-color reference manual included

For Windows[®] 3.1x, Runs on Windows[®] 95 and Windows NT

\$64⁰⁰*



COREL WEB.DESIGNER

Powerful Web Page Publishing!

- ⇒ Over 100 professionally designed templates
- ⇒ Easily create Web pages with word processor-type features
- ⇒ Add flair with background images, font sizes, styles and colors
- ⇒ Includes hyperlinks and image hotspots to link your Web page to local pages or other Internet sites
- ⇒ Create HTML text from most major word processor applications using Corel[®] WEB.Transit

For Windows[®] 3.1x, Runs on Windows[®] 95 and Windows NT

Includes
Corel WEB.GALLERY

\$96⁰⁰*



The Web
has never
looked
so good!

CorelXARA™
Fast, Easy and Amazing
32-bit Graphics!

For Windows[®] 95, Windows NT™
and Windows[®] 3.1x



From the makers
of CorelDRAW™

\$195⁰⁰*



Internet Mania™
An Easy Way to Surf and Gather
Information on the Internet

For Windows[®] 95, Windows NT™
and Windows[®] 3.1x

\$20⁰⁰*

CIRCLE 207 ON READER SERVICE CARD



Corel, Official World Title Sponsor
of the COREL WTA TOUR

DELLWare
1-800-449-3355

*US\$ plus applicable taxes and shipping



http://www.corel.com
Call now for faxed literature!
1-613-728-0826 ext. 3080
Document # 1109

Corel, CorelDRAW and Internet Mania are either trademarks or registered trademarks of Corel Corporation in Canada, the United States and/or other countries. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

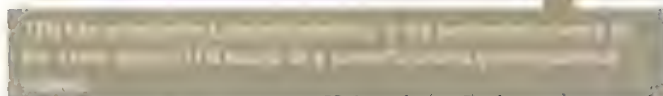
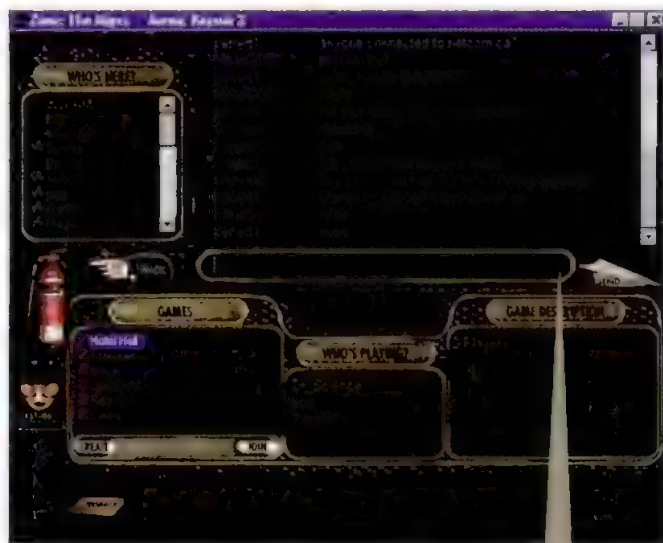
AT HOME

Multiplayer Gaming

proximately \$8 per month plus \$2 or \$3 per hour online. At the time of this review, TEN users could play CivNet, Duke Nukem 3D (both retail and shareware versions), Terminal Velocity, Warcraft, and Dark Sun Online. Upcoming game support will include Blood, Command & Conquer, Deadlock, Falcon 4.0, and Necrodome.

The client software needed to access TEN and play these games is available from TEN's Web site (www.ten.net), and it comes with some of the games supported by the service. Once you install the client (a straightforward, painless process), you can connect to the service using your own ISP or one of TEN's 190 local dial-up access numbers.

When you connect to TEN, you'll see a general welcome screen with a list of currently available games. After selecting a game to play, you'll proceed to that game's section on TEN. At this point, a bug-eyed



enter an arena. For each game, TEN provides a series of arenas, usually organized by skill level. Dialing into TEN via a 28.8-Kbps ISP connection, we typically received the "good" or "ok" rating required for actually playing games on the service. On occasion, we got a

games for other players to join, and join other players' games. The chats are pretty lively and—at least during our tests—rather immature. Excessive use of profanity and strings of insults flooded the chat windows with regularity. Unlike DWANGO, TEN has no moderator model in place to prevent this, and we often wished that it did.

Fortunately, the real action on TEN is in the game-playing itself. Setting up a game is simple, and joining someone else's is even simpler. The stylish interface helps make the process intuitive. The only change we would like to see is an 800-by-600 mode for the client (currently, the client runs at 640-by-480 only).

We conducted most of our tests on TEN playing Duke Nukem 3D, which is the most popular game on the service. In fact, TEN has a five-year exclusive deal to host Duke Nukem online, which may help maintain a large captive audience of Duke fans.

And there is never a shortage of these fans on TEN: We saw 75 Duke players online at

10:00 on a Sunday morning, and evenings see an average of 200 to 300 players. Also, users' skill levels are nicely mixed, so novice players actually stand a chance of doing well (in contrast to DWANGO). Few things scare off first-time users faster than a humiliating slaughter at the hands of a game veteran.

Unfortunately, Duke's performance on TEN may scare off more users than a lopsided game. At its best, TEN's performance was plagued with pauses and lag time. Games with more than four players (TEN supports Duke's maximum of eight) locked up on a regular basis. Even three-player games usually froze after 10 to 15 minutes. Next to Kali, TEN's performance was the least consistent.

Of course, this is beta, so the situation may change by the time TEN launches. In fact, the service underwent a major revision just as we went to press. We managed to get a quick look at some of the changes, and we liked what we saw. New features include player profiles, an excellent ranking system based on game performance, and the ability to launch games without waiting for a preset number of players to join. The performance, on the other hand, remained unimproved. If anything, it was a little worse.

TEN does have a lot going for it, with a solid client, a good mix of skill levels, and lots of players. But if the performance issues are not resolved by the time TEN goes "live," we're not convinced the service can maintain its large following. □

Total Entertainment Network. List price: Not yet announced. Total Entertainment Network, San Francisco, CA; 800-804-0836; www.ten.net.



creature named Mr. Bandwidth appears to check the quality of your connection. Mr. Bandwidth will also test your connection when you

"forget it" rating that meant we could chat in the TEN lobbies but couldn't play games.

In each arena, you can chat with other players, set up

Things that are
easy.



Things that are
inexpensive.



Things you can
trust.



Let's face it...if the product you're looking for is easy to use, affordable, and reliable, there's a very good chance you'll buy it.

That's why we at NETGEAR™ have one simple goal: to take the work out of networking. We do that by providing products that are easy to install, surprisingly inexpensive, and trustworthy.

You'll find these qualities in everything we make—from our Ethernet hubs to switches to ISDN products. Each of them has been designed to complement the way you work, the way your company is connected, and the way your company will grow. And the best part is that they're backed by Bay Networks, an industry leader in networking for more than a decade.

So if you're looking for the right networking gear, there's really only one company you should connect with. NETGEAR. Networking simplified.



- Ethernet Hubs (4, 8, or 16-port)
- Switches (10/100Mbps, 2 or 7-port)
- Fast Ethernet Hubs (8 or 16-port)
- ISDN Internet Routers

1-888-NETGEAR

<http://NETGEAR.baynetworks.com/home>

For reseller information, please call
Ingram Micro at 1-800-456-8000.

COMPUSA
For the store nearest you call 1-800-266-7872

NETGEAR™
A Bay Networks Company

 Bay Networks

©1996 NETGEAR. Volkswagen USA, Inc. is not affiliated with and does not endorse NETGEAR. NETGEAR is a trademark of Bay Networks, Inc. All rights reserved.

CIRCLE 266 ON READER SERVICE CARD

A Realistic, Interactive Chemistry Lab on CD-ROM

Explore the wonders of science with Corel® ChemLab, an interactive laboratory on CD-ROM. Students, teachers and other budding chemists can choose from a series of preset experiments or design their own. Use a host of realistic scientific instruments and equipment—but watch out, because one false move can have explosive consequences! Additional features such as the 3D molecule viewer, complete gas lab, periodic table and online chemistry textbook help make Corel ChemLab a powerful interactive learning tool!

Features:

- Fully documented experiments
- Freeform experiments
- Houghton Mifflin's *General Chemistry* by Darrell Ebbing, online textbook
- Interactive periodic table
- 3D molecule viewer
- Video clips of actual experiments and much more!



\$59.00*

Corel® ChemLab was designed for Windows® 95 and Windows® 3.1x

BACK to SCHOOL

Other educational and reference titles from the Corel® CD HOME line!



\$19.99*

Corel® Learning Series:
Learning the Internet
Easy, interactive learning
on CD-ROM



\$19.99*

Barron's™ Book Study Notes
Over 100 literary classics
at your fingertips



\$19.99*

The Complete
Shakespeare Collection™
A personal library of Shakespeare's
complete works on one CD-ROM



\$19.99*

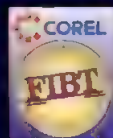
World's Greatest Classic Books™
Over 3,500 great literary works
at your fingertips

COREL ChemLab



1-800-555-6255

*US\$ plus applicable taxes.



Official Worldwide
Sponsor of Bobsleigh



Corel Official World
Title Sponsor of the
COREL WTA TOUR



<http://www.corel.com>
Call now for faxed literature!
1-613-728-0826 ext. 3080
Document # 1115

Corel is a registered trademark of Corel Corporation. Windows is a registered trademark of Microsoft Corporation. All other product and company names are trademarks or registered trademarks of their respective companies.

CIRCLE 042 ON READER SERVICE CARD

Advertisers' Index COMPANIES

Reader Service No.	Advertiser	Page
226	ADI Systems Inc.	53 @
235	AMS Tech.	42 @
122	AST Research	184-185 @
059	ATI Technologies	348-349 @
034	Acer America	61
076	Acer America	62
218	Adaptec	336
875	Adobe Systems Inc.	NE28 @
*	Adobe Systems Inc.	175
*	Adobe Systems Inc.	177
252	Adobe Systems Inc.	179 @
915	American Power Conversion	NE22-NE23 @
887	American Power Conversion	NE36 @
162	American Power Conversion	341-342 @
169	Arlington Computer Products	268
858	Artisoft Inc.	NE6
*	Attachmate	NE35
012	Austin Direct	151-153
898	BayNetworks, Inc.	NE11
136	Bold Data	190
312	Bookmaker Inc.	244
336	Bulldog Computers	284
329	CTX International	74
292	Caere Corporation	6 @
*	Canon Computer Systems	2-3
900	Citrix	NE29
*	Compaq Computer Corporation	70-71
*	Compaq Computer Corporation	180-181
*	Compaq Computer Corporation	210-211
387	CompuLink Research	273 @
130	COMPUTER DISCOUNT WAREHOUSE	254-255
180	COMPUTER DISCOUNT WAREHOUSE	256-257
159	COMPUTER DISCOUNT WAREHOUSE	258-259
348	CompuTrend, Inc.	50 @
017	Connectix	228
037	Corel Corporation	18
044	Corel Corporation	96
258	Corel Corporation	176
011	Corel Corporation	248
358	Corel Corporation	352
322	Corel Corporation	354
207	Corel Corporation	357
042	Corel Corporation	360
*	Dell Computer Corporation	C5-C8
*	Dell Computer Corporation	NE15
*	Dell Computer Corporation	68
189	Diamond Multimedia Systems	355
256	EXP Memory Products	340
225	Earthlink	133
*	EIZO NANO Technologies, Inc.	174
*	Epson America	10-11
014	First Source International	271 @
089	FOSA Computer	289
294	Fuji Computer Media	353
114	Fujitsu PC Corporation	54-55
224	Fujitsu PC Corporation	56-57

Reader Service No.	Advertiser	Page
*	Gateway 2000	48A-49
*	Global Village	82-83
391/138	H. Co./Micro Mall	286
062	HARTFORD COMPUTER GROUP	290-291 @
926	Hayes Microcomputer Products	NE31
*	Hewlett Packard	78-79
082	Hitachi PC Corporation	156-157
*	IBM Corporation	NE12-NE13
*	IBM Corporation	173
259	ITT Sheraton	236-237
024	Iconovex Corp.	136
127	Imation	209
390	In Focus Systems	238 @
278	Insight Direct	266-267
895	Insignia Solutions	NE33
*	Intel Corporation	90-91
166	Intercon Corp.	138
146	Iomega Corporation	217
383	Janna Systems, Inc.	4
859	Kingston Technology	NE32 @
106	Kingston Technology	140 @
019	L.A. Trade	288
*	Lotus Development Corporation	13
009	Luckman Interactive	131
006	Luckman Interactive	137
071	Lycos	84
067	MAG Innovision	16-17
045	Magix	260
283	MEGAHAUS	270 @
856	Micro Solutions Computer Products	284
855	Micro Solutions Computer Products	293
*	Micrografx	67
*	Micrografx	194
924	Micron Electronics	NE2-NE3 @
120	Micron Electronics	24-25 @
925	Micron Electronics	NE34 @
119	Micron Electronics	86 @
164	Micron Electronics	121-126 @
370	Micron Electronics	127 @
013	Micron Electronics	163-166 @
*	Microsoft	C2-C4, p1
*	Microsoft	14-15
*	Microsoft	26-27
*	Microsoft	30
*	Microsoft	196
*	Microsoft	220-221
091	Microtek	351
296	Midwest Memory Works	283 @
010	Midwest Computer Works	294-295 @
356	Motorola ISG	213 @
157	NEC Technologies	168-169
154	NEC Technologies	193
327	NECX	265
266	Netgear	359
877	NetManage, Inc.	NE17
275	NetManage, Inc.	128

Reader Service No.	Advertiser	Page
161	Netscape	247
036	Newcom	178
*	Novell, Inc.	NE8-NE9 @
*	Novell, Inc.	20-21 @
*	Novell, Inc.	46-47 @
*	Novell, Inc.	145 @
*	Novell, Inc.	147 @
*	Novell, Inc.	149 @
*	Okidata	225
394	Olivetti	106-107 @
*	Oracle Corp.	NE5
047	PC Connection	292 @
080	PC Power and Cooling	88 @
199	PC Zone	262-263
192	PCs Compleat	277 @
268	PCs Compleat	278-279 @
092	PCs Compleat	280-281 @
873	Powersoft	NE24 @
148	Primavera Systems	28
287	ProGen Systems	92
264	ProGen Systems	111
007	Rainbow Technologies	235 @
309	S.A.G./Storage Solutions	64-65
289	S3 Incorporated	344-345
033	Samsung	201
046	Samsung Electronics	32-33
*	Scitor Corporation	113
871	Seagate Technologies	NE18-NE19 @
879	Seagate Technologies	NE27 @
236	Sony Electronics	109
043	SPSS, Inc.	287
909	Standard Microsystems Corp.	NE21
057	Statsoft	45 @
132	Sun Microsystems	5
335	Sun Microsystems	134-135
053	Swan Technologies (see Zenith Data Systems Direct)	203-206 @
213	Sylvan Learning Systems	81
308	Symantec Corporation	72
001	Tektronix Inc.	160-161
368	Texas Instruments	35 @
353	Texas Instruments	98-99 @
208	The Forefront Group	189
*	Toshiba America	115-118
*	US Robotics Inc.	38
*	US Robotics Inc.	59
051	USA Flex	274-275
*	Visio	230
085	Winbook	77
163	Xerox Corporation	104
273	Xircom	23
303	ZD Net	296
178	ZD Press	297
053	Zenith Data Systems Direct	203-206 @

*No Reader Service#. Please Call Advertiser For Information.

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
ACCELERATOR BOARDS			
	Intel Corporation	Pentium Pro	90-91
ADD-ON BOARDS			
059	ATI Technologies	Graphic Boards	348-349
169	Arlington Computer Products	Mail Order, Hardware, Peripherals	268
289	S3 Incorporated	S3 Chips	344-345
BACKUP SOFTWARE			
915	American Power Conversion	Matrix	NE22-NE23
162	American Power Conversion	Back-UPS Office	341-342
BOOKS			
178	ZD Press	Books	297
BRIDGES/ROUTERS/GATEWAYS			
898	BayNetworks, Inc.	Latris	NE11
CD-ROM			
218	Adaptec	SCSI CD-Recordable	336
169	Arlington Computer Products	Mail Order, Hardware, Peripherals	268
256	EXP Memory Products	CD-ROM	340
CHIPS/PROCESSORS			
391/138	H. Co./Micro Mail	Memory, PCMCIA, Hard Drives	286
	Intel Corporation	Pentium Pro	90-91
106	Kingston Technology	Kingston Memory	140
019	L.A. Trade	Memory	288
289	S3 Incorporated	S3 Chips	344-345
COMMUNICATIONS SOFTWARE			
166	Intercon Corp.	Connect 4 Windows NFS Version	138
877	NetManage, Inc.		NE17
275	NetManage, Inc.	Z-Mail	128
312	The Forefront Group	ClickBook/Surf & Print	244
COMPUTERS/COMPATIBLES			
122	AST Research	AST Computers	184-185
034	Acer America	Acer Direct	61
076	Acer America	Acer Direct	62
012	Austin Direct	Austin Direct Desktops & Notebooks	151-153
136	Bold Data	Pentium Pro Systems	190
336	Bulldog Computers	Mail Order, Peripherals	284
	Compaq Computer Corporation	Presario	180-181
	Compaq Computer Corporation	Systems	210-211
	Compaq Computer Corporation	Portables	70-71
387	CompuLink Research	Infinity	273
130	COMPUTER DISCOUNT WAREHOUSE	Hardware	254-255
180	COMPUTER DISCOUNT WAREHOUSE	Hardware	256-257
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	258-259
348	CompuTrend, Inc.	Premio FX Pro200 Systems	50
	Dell Computer Corporation	Dell Desktops and Notebook	C5-C8
	Dell Computer Corporation	Dell Servers	NE15
	Dell Computer Corporation	Dell Dimension	68
014	First Source International	Memory, Notebooks, Peripherals	271
089	FOSA Computer	Portables	289
	Gateway 2000	PCs	48A-F
	Gateway 2000	Pentium PC	49
062	HARTFORD COMPUTER GROUP	Mail Order	290-291
	Hewlett Packard	HP PCs	78-79
278	Insight Direct	Mail Order	266-267
045	Magix	Desktop Computers	260
164	Micron Electronics	Micron PC's	121-126
370	Micron Electronics	Micron PC's	127
119	Micron Electronics	Micron PC's	86
296	Midwest Memory Works	PCs	283
010	Midwest Computer Works	PCs	294-295
154	NEC Technologies	NEC Desktop	193
327	NECX	PCs	265
394	Olivetti	Echo	106-107
047	PC Connection	PCs	292
199	PC Zone	Mail Order	262-263
192	PCs Complete	PCs	277
268	PCs Complete	PCs	278-279
092	PCs Complete	PCs	280-281
264	ProGen Systems	Desktop Computers	111
287	ProGen Systems	Desktop Computers	92
053	Swan Technologies	PCs	203-206
	Toshiba America	Desktop Computers	115-118
051	USA Flex	Notebooks, Desktop PC's, Peripherals, Printers	274-275
053	Zenith	PCs	203-206
DATA BASE MANAGERS			
	Lotus Development Corporation	Lotus Approach	13
873	Powersoft	Powersoft Powerbuilder	NE24
DESK TOP PUBLISHING			
	Micrografix	FlowCharter	67
	Micrografix	FlowCharter	194
DISK BACKUP & TAPE DRIVES			
146	Iomega Corporation	Iomega Jaz Drive	217
856	Micro Solutions Computer Products	Back Pack PD-CD	284
855	Micro Solutions Computer Products	800-T	293
DISPLAYS/MONITORS			
226	ADI Systems Inc.	Monitors	53
169	Arlington Computer Products	Mail Order, Hardware, Peripherals	268
	EIZO NANAO Technologies, Inc.	Monitors	174
390	In Focus Systems	LitePro 620	238
067	MAG InnoVision	MAG InnoVision Monitors	16-17
296	Midwest Memory Works	Monitors	283
010	Midwest Computer Works	Monitors	294-295
157	NEC Technologies	Monitors	168-169
046	Samsung Electronics	Monitors	32-33
FAX SOFTWARE			
	Global Village	FocalPoint	82-83
308	Symantec Corporation	WinFax Pro	72
FAX/MODEM			
208	Brother International Corp.	Multifunction Center	189
356	Motorola ISG	Modems	213
FINANCIAL PLANNING SOFTWARE			
	Microsoft	MS Money	14-15

Reader Service

No.	Company	Product	Page
FLOWCHARTING SOFTWARE			
	Micrografix	FlowCharter	194
	Micrografix	FlowCharter	67
	Microsoft	MS Project	220-221
	Visio	Visio 4.0	230
GRAPHICAL INTERFACE			
034	Acer America	Acer Direct	61
076	Acer America	Acer Direct	62
GRAPHICS SOFTWARE			
292	Caere Corporation	OmniPage Pro	6
258	Corel Corporation	Corel CAD	176
037	Corel Corporation	Office Professional	18
011	Corel Corporation	Ventura 7	248
358	Corel Corporation	Click & Create	352
322	Corel Corporation	Super 10 Pack	354
207	Corel Corporation	Internet Combo	357
042	Corel Corporation	Corel Chemlab	360
044	Corel Corporation	WordPerfect	96
	Micrografix	FlowCharter	67
	Micrografix	FlowCharter	194
	Visio	Visio 4.0	230
HARD DRIVES			
391/138	H. Co./Micro Mail	Memory, PCMCIA, Hard Drives	286
127	Imation	Imation	209
278	Insight Direct	Mail Order	266-267
146	Iomega Corporation	Iomega Jaz Drive	217
HARDWARE			
235	AMS Tech	AMS Notebooks	42
012	Austin Direct	Austin Direct Desktops & Notebooks	151-153
136	Bold Data	Pentium Pro Systems	190
208	Brother International Corp.	Multifunction Center	189
329	CTX International	EzPro 500 LCD Multimedia Projector	74
	Compaq Computer Corporation	Presario	180-181
	Compaq Computer Corporation	Systems	210-211
	Compaq Computer Corporation	Portables	70-71
387	CompuLink Research	Infinity	273
348	CompuTrend, Inc.	Premio FX Pro200 Systems	50
	Dell Computer Corporation	Dell Servers	NE15
	Dell Computer Corporation	Dell Dimension	68
189	Diamond Multimedia Systems	Stealth 3D	355
	Epson America	Printers	10-11
256	EXP Memory Products	CD-ROM	340
294	Fuji Computer Media	Fuji Photographic Printer	353
114	Fujitsu PC Corporation	Notebooks	54-55
224	Fujitsu PC Corporation	Notebooks	56-57
	Hewlett Packard	HP PCs	78-79
082	Hitachi PC Corporation	Hitachi Notebooks	156-157
390	In Focus Systems	LitePro 620	238
278	Insight Direct	Mail Order	266-267
	Intel Corporation	Pentium Pro	90-91
146	Iomega Corporation	Iomega Jaz Drive	217
106	Kingston Technology	Kingston Memory	140
045	Magix	Desktop Computers	260
283	MEGAHAUS	Hard Drives	270
091	Microtek	Microtek E6 Scanner	351
327	NECX	Peripherals	265
266	Netgear	Ethernet Hub	359
	Okidata	OL600E	225
080	PC Power and Cooling	Power Protection/Cooling Devices	88
199	PC Zone	Mail Order	262-263
289	S3 Incorporated	S3 Chips	344-345
046	Samsung Electronics	Monitors	32-33
033	Samsung	Samsung Notebooks	201
236	Sony Electronics	Digital Cameras	109
132	Sun Microsystems	Ultra Enterprise Servers	5
001	Tektronix Inc.	Printers	160-161
HOME MANAGEMENT SOFTWARE			
	Global Village	FocalPoint	82-83
HUBS			
266	Netgear	Ethernet Hub	359
INPUT DEVICES			
236	Sony Electronics	Digital Cameras	109
INTEGRATED SOFTWARE			
383	Janna Systems, Inc.	Janna Contact 95	4
INTERNET			
225	Earthlink	Earthlink Network ISP	133
166	Intercon Corp.	Connect 4 Windows NFS Version	138
009	Luckman Interactive	Luckman Yellow Pages	131
006	Luckman Interactive	Web Commander	137
071	Lycos	Lycos	84
161	Netscape	Netscape Server	247
312	The Forefront Group	ClickBook/Surf & Print	244
335	Sun Microsystems	JAVA	134-135
LABEL/FORM SOFTWARE			
292	Caere Corporation	OmniPage Pro	6
LAPTOP/PORTABLE COMPUTERS			
235	AMS Tech	AMS Notebooks	42
122	AST Research	AST Computers	184-185
012	Austin Direct	Austin Direct Desktops & Notebooks	151-153
329	CTX International	EzPro 500 LCD Multimedia Projector	74
	Compaq Computer Corporation	Portables	70-71
130	COMPUTER DISCOUNT WAREHOUSE	Laptops	254-255
180	COMPUTER DISCOUNT WAREHOUSE	Laptops	256-257
159	COMPUTER DISCOUNT WAREHOUSE	Laptops	258-259
	Dell Computer Corporation	Dell Desktops and Notebook	C5-C8
014	First Source International	Memory, Notebooks, Peripherals	271
089	FOSA Computer	Portables	289
114	Fujitsu PC Corporation	Notebooks	54-55
224	Fujitsu PC Corporation	Notebooks	56-57
	Gateway 2000	Notebooks	48A-F
	Gateway 2000	Notebook Computers	49
062	HARTFORD COMPUTER GROUP	Mail Order	290-291
082	Hitachi PC Corporation	Hitachi Notebooks	156-157
013	Micron Electronics	Micron Notebooks	163-166
296	Midwest Memory Works	PCs Hardware	283
010	Midwest Computer Works	PCs Hardware	294-295
394	Olivetti	Echo	106-107
047	PC Connection	PCs, Notebooks, Software	292
199	PC Zone	Mail Order	262-263

Advertisers' Index

PRODUCTS

Reader Service

No.	Company	Product	Page
192	PCs Complete	Notebook Computers	277
268	PCs Complete	Notebook Computers	278-279
092	PCs Complete	Notebook Computers	280-281
033	Samsung	Samsung Notebooks	201
368	Texas Instruments	TI Notebooks	35
353	Texas Instruments	TI Notebooks	98-99
051	USA Flex	Notebooks, Desktop PC's, Peripherals, Printers	274-275
085	Winbook	Winbook FX	77

LOCAL AREA NETWORKING

898	BayNetworks, Inc.	Latris	NE11
130	COMPUTER DISCOUNT WAREHOUSE	Networking Products	254-255
180	COMPUTER DISCOUNT WAREHOUSE	Networking Products	256-257
159	COMPUTER DISCOUNT WAREHOUSE	Networking Products	258-259
062	HARTFORD COMPUTER GROUP	Mail Order	290-291
266	Netgear	Ethernet Hub	359
161	Netscape	Netscape Server	247
	Novell, Inc.	Managewise	NE8-NE9
	Novell, Inc.	NDS	145
	Novell, Inc.	NDS	147
	Novell, Inc.	NDS	149
	Novell, Inc.	IntranetWare	20-21
	Novell, Inc.	GroupWise	46-47
909	Standard Microsystems Corp	Fast Ethernet	NE21

MAIL ORDER

169	Arlington Computer Products	Mail Order Hardware, Peripherals	268
336	Bulldog Computers	Mail Order, Peripherals	284
387	CompuLink Research	Infinity	273
130	COMPUTER DISCOUNT WAREHOUSE	Mail Order	254-255
180	COMPUTER DISCOUNT WAREHOUSE	Mail Order	256-257
159	COMPUTER DISCOUNT WAREHOUSE	Mail Order	258-259
014	First Source International	Memory, Notebooks, Peripherals	271
089	FOSA Computer	Portables	289
	Gateway 2000	Mail Order	48A-49
391/138	H Co/Micro Mail	Memory, PCMCIA, Hard Drives	286
019	L.A. Trade	Memory	288
045	Magix	Desktop Computers	260
283	MEGAHAUS	Hard Drives	270
120	Micron Electronics	Client Pro	24-25
296	Midwest Memory Works	Mail Order	283
010	Midwest Computer Works	Mail Order	294-295
327	NECX	PCs, Peripherals, Software	265
047	PC Connection	PCs, Peripherals, Software	292
199	PC Zone	Mail Order	262-263
192	PCs Complete	PCs, Notebooks, Software	277
268	PCs Complete	PCs, Notebooks, Software	278-279
092	PCs Complete	PCs, Notebooks, Software	280-281
053	Swan Technologies	PCs	203-206
051	USA Flex	Notebooks, Desktop PC's, Peripherals, Printers	274-275
053	Zenith	PCs	203-206

MASS STORAGE

127	Imation	Imation	209
146	Imation Corporation	Imation Jaz Drive	217
283	MEGAHAUS	Hard Drives	270
856	Micro Solutions Computer Products	Back Pack PD-CD	284
855	Micro Solutions Computer Products	800-T	293
309	S.A.G./Storage Solutions	Servers and Storage	64-65
871	Seagate Technologies	Seagate Software Corporate	NE18-NE19
879	Seagate Technologies	Tape Drives	NE27

MEMORY

014	First Source International	Memory, Notebooks, Peripherals	271
106	Kingston Technology	Kingston Memory	140
019	L.A. Trade	Memory	288

MISCELLANEOUS

256	EXP Memory Products	CD-ROM	340
259	ITT Sheraton	ITT Sheraton	236-237
	Microsoft	MS Automap	30
213	Sylvan Learning Systems	Training	81
303	ZD Net	NetByer	296

MODEMS

858	Artisoft Inc.	Modem Share	NE8
189	Diamond Multimedia Systems	Stealth 3D	355
926	Hayes Microcomputer Products	Modems	NE31
036	Newcom	Voice Data Modems	178
	US Robotics Inc.	WinModem Sportster	38
	US Robotics Inc.	VoiceModem Sportster	59
273	Xircom	100Mbps Ethernet PC Card Adapters	23

MULTIMEDIA

059	ATI Technologies	Graphic Boards	348-349
017	Connectix	Color QuickCam	228
062	HARTFORD COMPUTER GROUP	Mail Order	290-291
390	In Focus Systems	LitePro 620	238
858	Micro Solutions Computer Products	Back Pack PD-CD	284
855	Micro Solutions Computer Products	800-T	293
	Micrografix	FlowCharter	194
289	S3 Incorporated	S3 Chips	344-345
236	Sony Electronics	Digital Cameras	109

MULTIMEDIA SOFTWARE

017	Connectix	Color QuickCam	228
258	Corel Corporation	Corel CAD	176
037	Corel Corporation	Office Professional	18
011	Corel Corporation	Ventura 7	248
358	Corel Corporation	Click & Create	352
322	Corel Corporation	Super 10 Pack	354
207	Corel Corporation	Internet Combo	357
042	Corel Corporation	Corel ChemLab	360
044	Corel Corporation	WordPerfect	96
	Micrografix	FlowCharter	67

MULTITASKING SOFTWARE

383	Janna Systems, Inc.	Janna Contact 95	4
	Microsoft	MS Office	C2-C4, p1
	Microsoft	JAVA	196
	Microsoft	Microsoft Explorer	26-27

NETWORK INTERFACE CARDS

273	Xircom	100Mbps Ethernet PC Card Adapters	23
-----	--------	-----------------------------------	----

NETWORKING SOFTWARE

	IBM Corporation	Enterprise Communications	NE12-NE13
024	Iconovex Corp	Echo Search	136
166	Intercon Corp	Connect 4 Windows NFS Version	138
	Microsoft	MS Office	C2-C4, p1

Reader Service

No.	Company	Product	Page
161	Netscape	Netscape Server	247
	Novell, Inc.	Managewise	NE8-NE9
	Novell, Inc.	NDS	145
	Novell, Inc.	NDS	147
	Novell, Inc.	NDS	149
	Novell, Inc.	IntranetWare	20-21
	Novell, Inc.	GroupWise	46-47
	Oracle Corp	Oracle 7 Workgroup Server	NE5
871	Seagate Technologies	Seagate Software Corporate	NE18-NE19

OCR PRODUCTS

163	Xerox Corporation	Xerox TextBridge	104
-----	-------------------	------------------	-----

OPERATING SYSTEMS

	IBM Corporation	Merlin	173
--	-----------------	--------	-----

ORGANIZATIONAL SOFTWARE

383	Janna Systems, Inc.	Janna Contact 95	4
	Microsoft	MS Office	C2-C4, p1
	Microsoft	MS Money	14-15
	Microsoft	JAVA	196
	Microsoft	MS Project	220-221
	Microsoft	Microsoft Explorer	26-27
	Visio	Visio 4.0	230

PC ACCESSORIES

356	Motorola ISG	Modems	213
-----	--------------	--------	-----

PC DIRECT

387	CompuLink Research	Infinity	273
130	COMPUTER DISCOUNT WAREHOUSE	Reseller	254-255
180	COMPUTER DISCOUNT WAREHOUSE	Reseller	256-257
159	COMPUTER DISCOUNT WAREHOUSE	Reseller	258-259
014	First Source International	Memory, Notebooks, Peripherals	271
089	FOSA Computer	Portables	289
391/138	H Co/Micro Mail	Memory, PCMCIA, Hard Drives	286
062	HARTFORD COMPUTER GROUP	Mail Order	290-291
278	Insight Direct	Mail Order	266-267
019	L.A. Trade	Memory	288
045	Magix	Desktop Computers	260
283	MEGAHAUS	Hard Drives	270
856	Micro Solutions Computer Products	Back Pack PD-CD	284
855	Micro Solutions Computer Products	800-T	293
296	Midwest Memory Works	Reseller	283
010	Midwest Computer Works	Reseller	294-295
327	NECX	PCs, Peripherals, Software	265
047	PC Connection	PCs, Peripherals, Software	292
199	PC Zone	Mail Order	262-263
192	PCs Complete	PCs, Notebooks, Software	277
268	PCs Complete	PCs, Notebooks, Software	278-279
092	PCs Complete	PCs, Notebooks, Software	280-281
053	Swan Technologies	PCs	203-206
051	USA Flex	Notebooks, Desktop PC's, Peripherals, Pr	274-275
053	Zenith	PCs	203-206

PCMCIA

218	Adaptec	SCSI CD-Recordable	336
391/138	H Co/Micro Mail	Memory PCMCIA, Hard Drives	286
	US Robotics Inc.	WinModem Sportster	38
	US Robotics Inc.	VoiceModem Sportster	59
273	Xircom	100Mbps Ethernet PC Card Adapters	23

PERIPHERALS

017	Connectix	Color QuickCam	228
189	Diamond Multimedia Systems	Stealth 3D	355
	Epson America	Printers	10-11
294	Fuji Computer Media	Fuji Photographic Printer	353
	Gateway 2000	Peripherals	48A-49
390	In Focus Systems	LitePro 620	238
356	Motorola ISG	Modems	213
036	Newcom	Voice Data Modems	178
	Okidata	OL600E	225
394	Olivetti	Echo	106-107
047	PC Connection	Peripherals	292
053	Swan Technologies	PCs	203-206
001	Tektronix Inc	Printers	160-161
053	Zenith	PCs	203-206

POWER PROTECTION

915	American Power Conversion	Matrix	NE22-NE23
162	American Power Conversion	Back-UPS Office	341-342
080	PC Power and Cooling	Power Protection/Cooling Devices	88

PRINTERS

	Canon Computer Systems	Canon Multifunction Printer	2-3
	Epson America	Printers	10-11
294	Fuji Computer Media	Fuji Photographic Printer	353
	Okidata	OL600E	225
001	Tektronix Inc	Printers	160-161
051	USA Flex	Notebooks, Desktop PC's, Peripherals, Printers	274-275

PROGRAM DEVELOPERS

873	Powersoft	Powersoft Powerbuilder	NE24
007	Rainbow Technologies	Rainbow Sentinel Software Protection	235

PROGRAMMERS TOOLS UTILITIES

873	Powersoft	Powersoft Powerbuilder	NE24
007	Rainbow Technologies	Rainbow Sentinel Software Protection	235

PROJECT MANAGEMENT SOFTWARE

	Microsoft	MS Project	220-221
148	Primavera Systems	P32 0	28
	Scltor Corporation	Project Scheduler 7	113

REMOTE COMPUTING

	US Robotics Inc	WinModem Sportster	38
	US Robotics Inc	VoiceModem Sportster	59

SCANNERS

091	Microtek	Microtek E6 Scanner	351
-----	----------	---------------------	-----

SECURITY

007	Rainbow Technologies	Rainbow Sentinel Software Protection	235
-----	----------------------	--------------------------------------	-----

SERVERS

012	Austin Direct	Austin Direct Servers	151-153
	Dell Computer Corporation	Dell Servers	NE15
924	Micron Electronics	Micron Servers	NE2-NE3

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
120	Micron Electronics	Client Pro.	24-25
161	Netscape	Netscape Server	247
	Oracle Corp.	Oracle 7 Workgroup Server	NE5
309	S.A.G./Storage Solutions	Servers and Storage	64-65
132	Sun Microsystems	Ultra Enterprise Servers	5

SOFTWARE

	Adobe Systems Inc.	Adobe Postscript	175
	Adobe Systems Inc.	Adobe Postscript	177
252	Adobe Systems Inc.	Adobe Postscript	179
225	Earthlink	Earthlink Network ISP	133
	Global Village	FocalPoint	82-83
	IBM Corporation	Merlin	173
024	Iconovex Corp.	Echo Search	136
278	Insight Direct	Mail Order	266-267
895	Insignia Solutions	NTRIGUE	NE33
166	Intercon Corp.	Connect 4 Windows NFS Version	138
009	Luckman Interactive	Luckman Yellow Pages	131
006	Luckman Interactive	Web Commander	137
	Microsoft	MS Office	C2-C4, p1
	Microsoft	MS Money	14-15
	Microsoft	JAVA	196
	Microsoft	MS Project	220-221
	Microsoft	Microsoft Explorer	26-27
877	NetManage, Inc.	Servers	NE17
275	NetManage, Inc.	Z-Mail	128
161	Netscape	Netscape Server	247
047	PC Connection	Software	292
192	PCs Complete	Software	277
268	PCs Complete	Software	278-279
092	PCs Complete	Software	280-281
873	Powersoft	Powersoft Powerbuilder	NE24
148	Primavera Systems	P32 0	28
043	SPSS, Inc.	Statistical & Windows Software	287
871	Seagate Technologies	Seagate Software Corporate	NE18-NE19
335	Sun Microsystems	JAVA	134-135
308	Symantec Corporation	WinFax Pro	72
	Visio	Visio 4.0	230
163	Xerox Corporation	Xerox Textbridge	104

STATISTICAL SOFTWARE

043	SPSS, Inc.	Statistical & Windows Software	287
057	Statsoft	Statistical Software	45

TCP/IP

877	NetManage, Inc.	Servers	NE17
275	NetManage, Inc.	Z-Mail	128

TIME MANAGEMENT SOFTWARE

383	Janna Systems, Inc.	Janna Contact 95	4
-----	---------------------	------------------	---

TRAINING/SEMINARS/CONFERENCES

213	Sylvan Learning Systems	Training	81
-----	-------------------------	----------	----

UTILITIES

225	Earthlink	Earthlink Network ISP	133
009	Luckman Interactive	Luckman Yellow Pages	131
006	Luckman Interactive	Web Commander	137

VIDEO GRAPHICS/BOARDS

189	Diamond Multimedia Systems	Stealth 3D	355
-----	----------------------------	------------	-----

WINDOWS SOFTWARE

	Adobe Systems Inc.	Adobe Postscript	175
	Adobe Systems Inc.	Adobe Postscript	177
252	Adobe Systems Inc.	Adobe Postscript	179
024	Iconovex Corp.	Echo Search	136
166	Intercon Corp.	Connect 4 Windows NFS Version	138
383	Janna Systems, Inc.	Janna Contact 95	4
	Micrografix	FlowCharter	194
	Micrografix	FlowCharter	67
	Microsoft	MS Office	C2-C4, p1
	Microsoft	MS Money	14-15
	Microsoft	JAVA	196
	Microsoft	MS Project	220-221
	Microsoft	Microsoft Explorer	26-27
877	NetManage, Inc.	Servers	NE17
275	NetManage, Inc.	Z-Mail	128
148	Primavera Systems	P32.0	28
043	SPSS, Inc.	Statistical & Windows Software	287
	Sector Corporation	Project Scheduler 7	113
057	Statsoft	Statistical Software	45
308	Symantec Corporation	WinFax Pro	72
	Visio	Visio 4.0	230
163	Xerox Corporation	Xerox Textbridge	104

WORK GROUP SOFTWARE

	Novell, Inc.	IntranetWare	20-21
	Novell, Inc.	GroupWise	46-47

WORKSTATIONS

138	Bold Data	Pentium Pro Systems	190
	Hewlett Packard	HP PCs	78-79

For Additional Categories see MARKETPLACE PRODUCT INDEX PAGE 298.



Coming Up

Personal Printers

General business users are brightening their day by adding a little color to their documents. We've found that most users will be satisfied with the text quality from today's ink jet printers for business documents, and only desktop publishers are likely to notice the difference between the output of the better ink jet printers and that of low-end lasers. Does that mean low-end lasers will be the next group to fall victim to the ink jet onslaught? Although both lasers and ink jets represent important segments of the printer market, you might be surprised at who we think will be left standing. In our personal printer category, we take a look at 13 ink jets and 17 lasers to help you determine which will ultimately best suit your needs.

3-D Modeling Software

Have you ever wanted to add depth and breadth to your creations? Have you ever wanted to make them come to life—at least on your PC screen? Well, now you can: We review eight 3-D software products that let you model, render, and animate objects to your heart's content. Some of these products even play a role in television commercials and Web site image maps. A few, obviously, do it better than others. We'll give you the lowdown as to which products—in the low-end or high-end range—offer the best 3-D tools for your dollars.

VRML World Builders

The World Wide Web goes 3-D with the continued development of VRML, or Virtual Reality Modeling Language. The introduction of the VRML 2.0 specification holds great promise for interactive, virtual meeting places on the Web. Check out our reviews of world builders to find out what it takes to build your own 3-D world, then learn which VRML browser best suits viewing all the virtual possibilities awaiting you. Our tests reveal which world builders produce the most efficient, Web-friendly spaces. We also let you know which browsers deliver the best performance and offer the greatest compatibility across building environments.

The Microsoft ActiveX Platform

The introduction of ActiveX in Microsoft's browser, Internet Explorer 3.0, brings a powerful new development standard to the Web. We look at Internet Explorer's built-in ActiveX objects, its scripting languages, and the tools available to work with them. We also examine how ActiveX integrates with the de facto standards set by Netscape Navigator 3.0, including plug-ins, Java, JavaScript, and the Navigator browser objects.

Editorial Product Index

Reader Service

No.	Product	Company	Page
404	Address Fixer	CoStar Corp.	66
455	Affinity XEPro	Austin Direct	202
461	Aquanta QS/6	Unisys PC Division	227
413	Ascentia J20	AST Research Inc.	75
457	Avion AV 4900	Data General Corp.	216
424	Big 5 CD-ROM	Panasonic Communications & Systems Co.	76
954	Century LAN Analyzer, Version 1.0	Shomiti Systems Inc.	NE7
954	Century Media Module	Shomiti Systems Inc.	NE7
451	ColorStream II DP	Shinko Technologies Inc.	188
451	ColorStream II DPL	Shinko Technologies Inc.	188
441	Colorwriter LSR 2000	Digital Equipment Corp.	150
419	D&B MarketPlace, Version 3.0	MarketPlace Information Corp.	80
421	Desktop Projector 9100	Proxima Corp.	80
409	DiskMapper	Micro Logic Corp.	52
427	DisplayMaster	FS Photo Inc.	69
401	Domino	Lotus Development Corp.	51
426	EchoSearch 1.0	Iconovex Corp.	69
425	Encarta 97 Encyclopedia Deluxe Edition	Microsoft Corp.	80
410	Epson Stylus Color 500	Epson America	75
405	FloorPlan Plus 3D	IMSI	66
430	Grolier Multimedia Encyclopedia	Grolier Interactive	80
444	HP Color LaserJet 5M	Hewlett-Packard Co.	150
444	HP CopyJet M	Hewlett-Packard Co.	182
444	HP DeskJet 1600CM	Hewlett-Packard Co.	182
459	HP NetServer LX Pro	Hewlett-Packard Co.	223
431	HP Pavilion 7295V	Hewlett-Packard Co.	39
432	IBM Aptiva S74	IBM Personal Computer Corp.	39
445	IBM Network Color Printer	IBM Printing Systems Co.	162
420	Impression 860	ASK LCD	80
403	InfoModeler 2.0	Asymetrix Corp.	60
446	Kodak Digital Science 8650 PS	Eastman Kodak Co.	187
953	LANalyzer, Version 2.2	Novel Inc.	NE10
955	LANdecoder, Version 3.0	Triticom	NE14
447	Lexmark Color Jetprinter 4079 Plus	Lexmark International Inc.	183
447	Lexmark Optra C	Lexmark International Inc.	167
408	Microsoft Small Business Financial Manager	Microsoft Corp.	66
416	Mita AF-1200	Mita Copystar America Inc.	76
448	Mitsubishi S3600-40U	Mitsubishi Electronics America Inc.	192
448	Mitsubishi S6600-40U	Mitsubishi Electronics America Inc.	192
423	MJ-4.8s CD-ROM Changer	Nakamichi America Corp.	76
411	MyInternetBusinessPage	MySoftware Company	75
429	Net2Phone	IDT Corp.	58
443	Pictura 310e	Fargo Electronics Inc.	188
406	PowerSync 3.0	LinkPro Technologies Inc.	52
422	Preso! PageManager Suite	NewSoft Inc.	80
443	PrimeraPro	Fargo Electronics Inc.	188
458	Prioris 6000 Series ZX 6200MP/4	Digital Equipment Corp.	216
456	ProLiant 5000 6/200	Compaq Computer Corp.	215
460	ProSera SH	NEC	226
449	QMS magicolor CX/40	QMS Inc.	167
449	QMS magicolor WX	QMS Inc.	167
454	Revolution Quad6 6200/512	Advanced Logic Research Inc.	199
450	Seiko ColorPoint 835 PS	Seiko Instruments USA Inc.	195
951	685 Enterprise LANMeter	Fluke Corp.	NE16
952	Sniffer Network Analyzer, Version 5.0	Network General Corp.	NE20
433	Sony PCV-90	Sony Electronics	39
402	StatView, Version 4.5	Abacus Concepts	60
442	Stylus 1500	Epson America Inc.	179
442	Stylus Pro XL	Epson America Inc.	179
407	Tally T7070	Tally	63
452	Tektronix Phaser 240	Tektronix Inc.	186
452	Tektronix Phaser 350	Tektronix Inc.	175
452	Tektronix Phaser 440	Tektronix Inc.	195
452	Tektronix Phaser 480X	Tektronix Inc.	195
452	Tektronix Phaser 550	Tektronix Inc.	175
434	Toshiba Infinia 7200	Toshiba American Information Systems Inc.	39
415	Visa/Plus GlobalLocator	Visa International ATM Network	76
414	Vivitar Motion Picture Phone	Vivitar Corp.	75
957	Web Commander, Version 1.0	Luckman Interactive Inc.	NE26
412	WebPublisher	Asymetrix Corp.	75
956	Windows NT Server 4.0	Microsoft Corp.	NE25
418	WINProbe 95	Quarterdeck Corp.	76
428	WinWeather	Insanely Great Software	58
453	XPrint Plus 4915	Xerox Corp.	177
453	XPrint Plus 4920	Xerox Corp.	177

NE—Network Edition.

For information about the Network Edition of *PC Magazine*, call Circulation at 800-289-0429.

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

Thanks but No Thanks

All of us at ARF are eternally grateful for all your submissions. Once in a while, however, it behooves us to remind you of that which is no longer funny. We respectfully submit the 1996 list of items that you should *not* bother sending:

- Classified ads that include "sloppy disk drives."
- Jokes about Bill Gates's wedding.
- Photos of keyboards that are accidentally reversed.
- Screenshots that show spell-checkers replacing *Pentium* with the word for a male body part.
- Ashton-Tate jokes.
- Stories about people trying to use a mouse as a foot pedal or a microphone.

GROANERS

Web giants Yahoo! and Netscape announced a surprise merger and relocation today. The new firm will move to Israel and call itself Net 'n' Yahoo.

PRINT ON IT



 The amazing print remover! (Action Paper ad.)

Classified Intelligence

"Commodore 64 like new in box, used very little. Also a few games. First \$150 takes it home or trade for 300-pound beef calf, any breed of beef."—UNCLE HENRY'S WEEKLY SHOPPER

If your entry is used, we'll send you \$50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802 or via e-mail (text items only) to don_willmott@zd.com. Winners this issue: Jim Brown, Mary MacDougall, David McClees, Blake Scherer, Barry Simon, and Byron Todd.



RICHARD TENNANT

Overwhelmed and Uncomfortable

An ad for T/Maker's ClickArt features a fake newsletter with this biological typo: "I'm struck by the number of people in my audiences who seem perpetually overwhelmed. The irony is that these people could take breaks throughout their day, and throughput their wee, but they don't."



 Yutz of the month. (Epson catalog.)

The Mission of the Oklahoma Turnpike Authority

CONSTRUCTION ZONE

 Spotted at the Oklahoma Turnpike Authority Web site.

DELL LATITUDE
Dependable Notebooks
With Superior Battery Life

DELL® LATITUDE® LM P133ST
133MHz PENTIUM® PROCESSOR

- NEW Multimedia Notebook
- ★ 12.1" SVGA Active Matrix Color Display
- 8MB RAM/810MB Hard Drive
- 256KB L2 Cache
- ★ Options Bay accepts 6X CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Li-Ion Battery
- ★ PCI Bus with 128-bit Graphics Accelerator

- ★ Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- ★ Touchpad/IrDA-1 Port
- Under 7 Pounds*
- Extendable 1 Year Warranty†
- ★ Upgrade to 24MB RAM, add \$299.
- ★ Upgrade to a 1.3GB hard drive, add \$200.

Business Lease*: \$111/Mo.
Order Code #B00051

NEW Multimedia
Dell Latitude LM
Notebook

\$2999



ANOTHER DELL FIRST: THE USE OF "MULTIMEDIA" AND "AFFORDABLE" IN THE SAME SENTENCE.

Multimedia notebook meet affordable. Affordable meet multimedia notebook. We refer to the Dell® Latitude® LM notebook.

For a temptingly low price you receive Neo-Magic's stunning 128-bit graphics accelerator,



Designed for "an industry first."
Microsoft® Windows® 95
MPEG software for up to 30-frames-per-second video. The vibrancy of a

12.1 inch SVGA (800 x 600) active matrix display. A 6X CD-ROM. Along with integrated 16-bit stereo sound and built-in speakers.

What's more, this system is built around Dell's famous Lithium-Ion battery technology. Which means your graphics presentations can dazzle crowds for hours and hours.

We're the first on our block to offer such a notebook. Why not be the first on your block to own one? Give us a call today.

DELL®

TO ORDER

800-847-4142

<http://www.dell.com>

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm In Canada, call 800-233-0702

Keycode #04323

\$2599
With Free Software

DELL DIMENSION™ XPS P200s
200MHz PENTIUM® PROCESSOR

- ★ **32MB SDRAM Memory**
- 512KB Pipeline Burst Cache
- ★ **NEW 3.2GB Hard Drive [9.5ms]**
- 15TX Trinitron Monitor (13.7" v.i.s.)
- ★ **NEW 2MB EDO VIRTGE 3D Video Card**
- 8X EIDE CD-ROM Drive
- AWE32 Wave Table Upgrade Card
- Altec Lansing ACS-31 Speakers

- MS® Office Professional with Bookshelf for Windows® 95
- ★ **FREE Norton/Visio Express Software Suite™**
- Microsoft® Windows 95/MS Plus! CD/30 Days Free Support/MS Mouse
- 3 Year Limited Warranty†
- ★ **Upgrade to a 17LS monitor (15.7" v.i.s.), add \$199.**

Business Lease⁰: \$96/Mo.
Order Code #500336

FREE!



HOW TO SUCCEED IN BUSINESS WITHOUT BUYING SOFTWARE.

Besides its formidable 200MHz Pentium processor, this Dell Dimension comes with a powerful package of business software** pre-loaded. Not games. Not fluff.



Serious stuff like Microsoft Office for Windows 95. The 32-bit virus protection of

Norton AntiVirus. The powerful file management features of Norton Navigator. The data protection and recovery tools of Norton Utilities. And the many diagramming tools of Visio Express 4.0. Of course, it also comes with built-in Dell reliability, built-in Dell value, and our guaranteed next-business-day on-site^A service. So pick up the phone and order today. It may be the fastest way to get ahead in business yet.



TO ORDER

800-847-4143

<http://www.dell.com>

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm In Canada, call 800-233-0702

Keycode #04322